

Erasing and Rewriting in Manuscript Cultures

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Erasing and Rewriting in Manuscript Cultures

Practices of Text Obliteration and Manuscript Reuse
in a Global Perspective

Edited by
Michele Cammarosano

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Contents

Michele Cammarosano

A Framework for the Analysis of Rewriting Practices, and Three Case Studies: Clay Tablets, Wax Tablets, and Erasable Coatings — 1

Marilena Maniaci

The Future of the Past: Rewriting as a Cultural Practice from Handwritten Artefacts to the Digital Age — 63

Clay and Wax

Carmen Gütschow

A Restorer's Look at Rewritable Media: Cuneiform Clay Tablets in Conservation — 75

Jon Taylor

Temporality on Clay Tablets: When the Component Parts of a Cuneiform Document Were Committed to Clay — 115

Cécile Michel

Erasing Signs and Lines on Old Assyrian Cuneiform Clay Tablets — 161

Jamie Novotny

Ashurbanipal and Objects for Esagil and Ešarra: A Case Study of Erasing, Removing, and Replacing Texts at the Height of the Assyrian Empire — 191

Anna Willi

Refill, Reuse, Recycle? Reusing Wax Tablets in the Roman North-western Provinces — 217

Serena Ammirati

Some Remarks on the Lexicon of Erasure between Antiquity and Middle Ages — 255

Georgios Boudalis

From Wax Tablets to Codices: The Possible Influence of the Stylus Holder on the Structure of Early Multi-gathering Codices — 263

Thomas Wozniak

Wax Tablets as Writing Media during the Middle Ages — 309

Papyrus, Parchment, Paper, and Wood

Elena L. Hertel

Reasons for Papyrus Reuse in Ancient Egypt — 335

Paola Buzi

Coptic Palimpsests: When, Where, and Why? — 357

Sara Fani

**How to Erase Writing According to Recipes from the Arab World:
Textual Analysis of Premodern Technical Recipes — 373**

Claudia Colini, Giuseppe Marotta, Sowmeya Sathiyamani, Valentina Yañez Langner,
Annie Muller, Katerina Grigoriadou, Chen Yu

**How to Erase Writing According to Recipes from the Arab World:
Replication and Analytical Report — 411**

Andrea Brigaglia, Dahir Lawan Mu'az

**Transient Texts: Erasable Writing on Wood, Sand, and Metal in Northern
Nigerian Islam — 439**

Antonio Manieri

**Writing and Rewriting Wooden Tablets in Seventh- and Eighth-century Japan:
The *Mokkan* Used for Learning — 475**

Contributors — 503

Index of Written Artefacts — 507

Michele Cammarosano

A Framework for the Analysis of Rewriting Practices, and Three Case Studies: Clay Tablets, Wax Tablets, and Erasable Coatings

Abstract: This study takes rewritability as a key lens for understanding writing habits, proposing a framework for investigating practices of erasing and rewriting in premodern manuscript cultures. It begins by exploring the intersections between rewritability and the concepts of erasable manuscripts and ephemeral writings. It then presents an analytical examination of the factors influencing rewriting practices and discusses how these can be compared to each other. Finally, it considers three exemplary types of rewritable manuscripts – clay tablets, wax tablets, and erasable coatings – discussing the material properties of the substances involved, the related techniques of (re)writing, and their historical significance.

9

1 Rewritability, erasable manuscripts, and ephemeral writings

The aim of this contribution is threefold: to provide a framework for exploring the role of the rewritability of writing supports in manuscript cultures; to offer an introduction to the contributions gathered in this volume; and to present three exemplary case studies of rewritable manuscripts, namely, clay and wax tablets, and erasable coatings.

The term *rewritability* refers to the capacity of a support to allow for the erasure of what has been written and its subsequent rewriting.¹ Framed in such general terms, the concept of rewritability can apply to a wide variety of materials, situations, and processes. Virtually any material – from stone to paper, parchment to sand – can serve as a writing surface from which the written text can be more or less completely obliterated so that the surface can be inscribed again. It is important here to distinguish between technical aspects – in particular, given a certain material and a certain writing technique applied to it, the extent to

¹ The present study focuses on rewritability as related specifically to glottographic writing (henceforth simply ‘writing’; see Hyman 2006).

which, the ways in which, and under what conditions it can be obliterated (the material's *affordance*) – and the rationale behind the process of erasure and re-writing.² Thus, alongside cases where the process of erasure and rewriting has left no traces at all of the previous text, we also find instances in which the process intentionally leaves visible traces of the obliterated text, even when it would have been technically possible to erase it completely, as well as cases in which the intention is to erase the writing as thoroughly as possible, but this proves technically unfeasible.³ Moreover, rewritability can concern only a small part of the written surface within a single artefact – as in the case of a patch of parchment bearing a word to be corrected, which the scribe scrapes off before reinscribing it – or the entire written surface of the artefact, as in the case of a slate covered with notes that is wiped clean with a cloth. Finally, the rewriting process may involve very different degrees of modification of the original artefact. Within this broad range of possibilities and situations, the focus of this volume is on a particular kind of inscribed artefact, namely, manuscripts, and a specific form of rewritability, namely, the practices developed to reuse a manuscript as many times and as easily as possible. This focus is further narrowed to selected historical contexts of premodern and traditional societies.

Consequently, the protagonists of this volume are what we may call *erasable* (or *rewritable*) *manuscripts*: those expressly designed to be easily and recursively reused. As will be seen, certain materials – particularly clay, wax, and wood – are especially well suited to this purpose. Importantly, there exists a special affinity between rewritable manuscripts and what may be termed *ephemeral writings*, that is, texts intended to be temporary. The supports used for ephemeral writings are necessarily destined either for disposal or reuse; where reuse is both easy and recursive, we are dealing with rewritable manuscripts. Conversely, the natural –

2 Text obliteration often has little to do with the will to suppress knowledge, and the commonly cited distinction between ‘intentional’ and ‘unintentional’ destruction of text is, on closer inspection, problematic (Giele 2019). On the concepts and methods involved in studying erasing and rewriting practices see also Crisci 2003.

3 See Östenberg 2018 on the so-called *damnatio memoriae* in ancient Rome, where the erased name often was deliberately left readable, underscoring and cautioning against the damned person; on the necessity of leaving corrections visible and recognisable as such in medieval documents, see Da Rold 2020, 99; on paper's erasability see also Section 2.1 below. The opposite scenario, where erasure is intended to be non-visible once executed but is not completely successful due to technical difficulties, is aptly exemplified by the difficulty of completely erasing iron-gall ink from parchment, leading to the possibility of recovering previous layers of text in palimpsests (Gippert, Maksimczuk and Sargsyan (eds) 2025).

though not exclusive – destined use for rewritable manuscripts, as defined above, is indeed ephemeral writing.

In addressing the topic of rewritability, as delineated above, this volume aims not at completeness or systematic coverage but rather at presenting a series of exemplary spotlights that highlight the deep impact of rewriting practices in literate societies, as well as the great potential that a comparative investigation of such practices holds for the study of manuscript cultures. The majority of the contributions collected here focus on those materials most eminently suited to serving as supports for rewritable manuscripts in the premodern world – namely, clay, wax, and wood – and on historical contexts in which these types of materials and manuscripts played a central role in the broader landscape of writing practices.

In line with this approach, the volume's first part gathers studies devoted to the materiality of clay as a writing support in the ancient Near East (Carmen Gütschow, Jon Taylor, Cécile Michel, Jamie Novotny) and to wax tablets in the classical and medieval periods (Anna Willi, Serena Ammirati, Georgios Boudalis, Thomas Wozniak). The second part then features studies of supports which, unlike clay and wax, are typically inscribed with ink and do not allow for an indefinitely repeatable reuse of the writing surface but rather permit only a limited number of iterations. These include papyrus in ancient Egypt (Elena Luise Hertel); parchment and papyrus manuscripts in Coptic Egypt (Paola Buzi); papyrus and paper in the Arabo-Islamic world (Sara Fani, Claudia Colini and colleagues); wood, sand, and metal in contemporary Nigeria (Andrea Brigaglia and Dahir Lawan Mu'az); and *mokkan* in Nara Japan (Antonio Manieri). The contributions are preceded by a reflection from Marilena Maniaci, who, considering the collected studies as a whole, invites us to reflect on how the study of rewritability contributes to our understanding of writing practices both past and present.

There is scarcely any need to stress just how partial and selective the picture painted by this volume is. To name only two major absences, the reader will find no contributions on ancient China or India, while the classical and medieval periods are treated in a selective and limited fashion. May this volume, then, serve as both stimulus and auspice for broader and more systematic research on the role of rewritability!

2 Materials, techniques, contexts:

Framing rewriting practices

Given the wide range of phenomena associated with the concept of rewriting and the different perspectives from which it can be approached, a need arises to develop a framework for studying it in the most comprehensive and systematic possible way. In the following, a set of dedicated criteria are presented, which in turn serve as the foundation for a deeper exploration of the exemplary rewriting technologies discussed in Sections 3–5.

2.1 Materials and techniques

A comparative approach to rewriting practices requires a heuristic framework capable of accommodating a wide range of diverse factors across various historical settings. Such a framework should be designed to allow for meaningful comparisons of significantly divergent practices by situating them within a consistent grid of parameters, while also enabling detailed descriptions of the materials and processes involved.⁴

The framework I propose distinguishes two levels of analysis: one concerning technology, the other the historical context. At the technological level, rewriting practices are examined and described from a purely technical perspective, focusing on the materials interacting with each other, the conditions under which they

⁴ I am not aware of any systematic framework for analysing practices of erasure and rewriting. In the programmatic chapter on reuse (*‘Wiederverwenden’*; see Bolle, Theis and Wilhelmi 2015) within the volume *Materiale Textkulturen: Konzepte – Materialien – Praktiken*, arising from the German Research Foundation Sonderforschungsbereich 933 *‘Materiale Textkulturen: Materialität und Präsenz des Geschriebenen in non-typographischen Gesellschaften’*, the authors refrain from providing such a framework, emphasising instead the vast variety of contexts and motivations in which the reuse of a written artefact can occur, and highlighting the difficulty of drawing clear boundaries and addressing the subject in a unified and coherent manner. The recent volume *Palimpsests and Related Phenomena across Languages and Cultures* (Gippert, Maksimczuk and Sargsyan (eds) 2025), originating from Jost Gippert’s European Research Council project *‘The Development of Literacy in the Caucasian Territories’* (DeLiCaTe), offers a rich set of case studies on the phenomenon of palimpsests, with a particular focus on parchment. Gippert’s introductory chapter provides an excellent overview, particularly of the concept of ‘palimpsest’ as traceable from classical sources to contemporary studies (Gippert 2025). Given the volume’s scope and the nature of its case studies, this work, too, does not aim to develop a general model for rewriting practices.

operate, and their role in the rewriting process. This is schematically defined through the interaction of three fundamental parameters: (1) writing support; (2) writing process (including the writing substance); and (3) the process of textual obliteration. Each parameter is to be considered in terms of its temporal dynamics and the environmental conditions under which the process occurs: how the materials evolve over time, under what conditions of temperature, humidity, salinity, and so on, and how (re)writing and text obliteration take place.

This framework makes it possible to identify and characterise the core mechanisms underlying diverse historical practices of reusing writing surfaces. It also enables a basic yet meaningful comparison between them. For instance, it becomes immediately evident that certain materials have historically been used for such practices in far more varied ways than others. Most importantly, the framework accommodates a wide range of surface reuse practices beyond methods of ‘erasure and rewriting’ proper (e.g. paper recycling through repulping).

A basic list of key variables for the three primary parameters listed above includes:

1. Supports: inorganic (stone, sand, metals, clay, pottery); organic (papyrus, palm leaves, bamboo, birch bark, wood, textiles, leather, parchment); mixed (ivory, bone, chalk-based coatings, wax mixtures).⁵
2. Writing: displacement of the support material, subtraction of the support material, addition of a writing substance (inks, etc.), as well as the tools used in these processes.
3. Textual obliteration: reshaping of the support, removal of the writing substance while leaving the surface intact (e.g. by solvent application, adhesive substances) or while damaging the support (e.g. rubbing, scraping, chiselling); not rarely, a combination of multiple actions is involved.

Each material and each practice of writing and text obliteration can, of course, be further specified at various levels of detail.

The bewildering variety of practices adopted throughout history for text obliteration and rewriting stems from the many possible combinations of these

⁵ The distinction between writing supports made of organic, inorganic, and mixed materials is conventional and pragmatic. A concise yet information-rich overview of the writing supports used in Antiquity is provided in Capasso 2005, 45–63, which classifies materials within a broad bipartition between those readily available in nature and those specifically manufactured or substantially re-worked to accommodate writing. Comprehensive discussions can be found in Breton-Gravereau and Thibault (eds) 1998 and in the ‘Materialien’ section of Meier, Ott and Sauer (eds) 2015. Useful online resources include <<https://materialarchiv.ch/>> and <<https://www.csmc.uni-hamburg.de/profiling-guide.html>> (all URLs cited in this contribution were last accessed on 18 April 2025).

three parameters, as well as from the ingenuity with which the *Homo (re)scribens* used the materials and knowledge available in different times and places for different and varying aims, in diverse socioeconomic and cultural settings.

Moist clay, wax mixtures, and erasable coatings applied to tablets or sheets, discussed in Sections 3, 4, and 5 respectively, are three important and widespread writing supports with a special affinity to erasability. But, as already said, all materials are rewritable up to a certain extent and under certain constraints. Stone and metal, which we instinctively associate with permanence, also have been widely used as erasable writing surfaces throughout history – think of slates inscribed with chalk or the lead sheets common in ancient Greece and Rome for letters, spells, and more, which were quite easy to smooth and reincise with a new text. In ancient China, bamboo and wooden slips and tablets, inscribed in ink, were widely used, with corrections performed by scraping with a knife and reuse by slicing off the entire surface.⁶ Ink on papyrus can be washed out,⁷ and several methods for reusing parchment are known from medieval and early modern manuscripts.⁸ Paper is less amenable to erasure and rewriting, which famously led rulers around the globe to impose its use instead of parchment or wood for official documents that should never be altered. This is why methods for correcting mistakes in paper manuscripts mostly involve soaking the relevant signs in a reagent or covering them with a substance that can, in turn, be overwritten.⁹ However, under certain conditions, ink on paper also can be obliterated – whether or not the author intended it – as Darya Ogorodnikova and Khaoula Trad’s recent study aptly documents.¹⁰

Bone inscribed with ink, used throughout a number of manuscript cultures from ancient China to twentieth-century Ethiopia, can also be easily reused by washing out the written text.¹¹ In the Middle Ages, ivory notebooks written in ink or metalpoint were praised for their erasability – a technique already known in

⁶ Giele 2019, 218–220; Staack 2023, 39–46.

⁷ See Elena Hertel’s contribution to this volume.

⁸ The topic of reusing parchment is closely related to palimpsest studies. For the technical aspects, see Bartl et al. (eds) 2005, 653–656; Agati 2009, 75–76; Quandt 2011, 83–88; Tchernetska and Wilson 2011, esp. 243–249, 257–259; Engel 2021.

⁹ For corrections and erasures on paper in the European Middle Ages, see Da Rold 2020, 114–115. In ancient China, an orpiment paste could be applied and then overwritten; see Drège 2024, 38. For the Islamic world, see the methods discussed by Sara Fani and Claudia Colini and colleagues in their contributions to this volume.

¹⁰ Ogorodnikova and Trad 2025.

¹¹ Bone, together with parchment scraps, has been the standard material for practising writing in the traditional Ethiopian manuscript culture; see Alehegne 2011, 149.

ancient Rome. Between the late seventeenth and nineteenth centuries, memorandum books with ivory sheets bound together like a fan were widespread on both sides of the Atlantic, used for taking quick notes while away from home or traveling, and even as dance cards (Fig. 1).¹² Sand and dust tablets used for writing – whether for exercises, calculations, or divination – represent yet another important category of erasable manuscript.¹³



Fig. 1: Ivory memorandum book with silver clasp, acquired by Katherine Bigelow in 1819, from England, 9 × 4.5 × 1.3 cm, Boston, MA, Museum of Fine Arts, accession no. 52.1306; reproduced with permission.

¹² Stallybrass 2006, 555–558. For ancient Rome, see Martial's reference to ivory notebooks (*pugillares ebores*; *M. Valerii Martialis Epigrammaton libri*, §14.5, ed. Heraeus 1925).

¹³ On dust boards and blackened, erasable boards used in the Sanskrit mathematical tradition, see Keller 2024, 96–103, with important methodological considerations on pp. 100–101 with n. 64. As Agathe Keller notes, calculations could also be performed using seeds, grains, and cowrie shells placed on grids, with or without the support of boards. On the comparable situation of popular arithmetic in early modern Europe, which likewise involved both erasable tablets and tokens on grids, see Section 5.2. For sand tablets in the Islamic tradition, used for calculations, divination, and advanced teaching, see Fahd 1966, 196–204; Savage-Smith and Smith 1980; and Andrea Brigaglia and Dahir Lawan Mu'az's contribution to this volume. Writing on sand and dust is attested of course all around the globe, but only sand and dust tablets can be considered manuscripts proper. Importantly, writing on sand can be less ephemeral than one may assume; see the example of messages written in the sand by the Tuareg to communicate with each other, lasting several days (Cardona 1990, 146).

From a comparative perspective, practices of erasing and rewriting can be examined through multiple lenses. One lens concerns the extent to which a given writing support, in combination with a specific writing technique and method of text obliteration, lends itself to recursive reuse. Between immediate disposal and potentially infinite reuse, there exists a wide spectrum of intermediate possibilities. Clay and wax tablets (see Sections 3 and 4) can, in principle, be reused indefinitely without the need to add or remove any material. In contrast, wooden sticks and slips inscribed with ink, widely used for note-taking and learning to write in China and later also in Korea and Japan, played a fundamental role in the manuscript cultures of these regions. However, since their reuse involved shaving the surface with a knife, thinning them, they could be reused only a limited number of times (see Antonio Manieri's contribution to this volume on *mokkan* use in Nara Japan). Wood was also employed in other contexts, but with its surface treated such that inks could be washed off easily. A still different case is that of whitewashed or otherwise coated tablets or sheets, widespread from Antiquity to medieval and early modern Europe: they can in principle be reused indefinitely but require periodic renewal of their coating, typically based on chalk (see Section 5). Other writing supports arguably were developed primarily for long-lived texts, with obliteration and rewriting occurring only secondarily or in exceptional cases. This is the case of papyrus and parchment, as well as paper, which only in relatively recent times – thanks to the widespread availability of graphite pencils, and later also of erasers – has become one of the most common rewritable supports.

In evaluating the ease with which a given writing support, in combination with a specific writing technique and method of text obliteration, can be prepared and reused, it is crucial to avoid generalising assumptions that in fact hold true only under certain conditions and circumstances. On the one hand, it might seem straightforward to observe that some rewriting methods appear more economical than others: washing away an inscription from an ostrakon may take only a few moments; scraping and rewriting a word on a wax tablet might require just a quick pass of the spatula typically found at the end of a stylus; an unbaked clay tablet can be erased simply by submerging it in water for a few minutes or, at most, a few hours. Conversely, scraping a word from parchment, or smoothing the surface of a lead sheet – let alone a harder metal – inscribed via engraving or punching appear to be more 'costly' processes, requiring greater effort and specialised tools. However, both cost-effectiveness and presumed ease of execution are vague categories prone to misinterpretation if applied in absolute terms without precisely defining their parameters. The cost of materials and tools can vary significantly from one place and time to another, as can the availability of resources, and whether a particular process is easy or difficult depends on specific

skills and acquired habits. Furthermore, the material cost of a given object is not the only factor influencing the inclination towards reuse; ideological and cultural considerations can play a greater role than monetary concerns, particularly in non-capitalist societies and non-utilitarian contexts. A good case in point is the reuse of papyrus, on which see Elena Hertel's contribution to this volume.

Assessing cost-effectiveness also requires considering not only the direct material aspects related to the reuse process itself but also any intangible costs (e.g. cognitive effort) and those associated with the initial preparation of the writing support and any necessary writing materials, as well as disposal costs if materials need to be discarded at the end of the process. This brings us back to the question of how long reuse is possible and whether it involves the subtraction or addition of substances. For example, a wax tablet represents a relatively sophisticated and 'expensive' technology, but, once available, it can, in principle, be reused indefinitely. In contrast, a potsherd inscribed by engraving or with ink may be effortlessly obtained in many contexts and essentially cost nothing, but, on the other hand, it must be smoothed down or supplied with fresh ink every time one wishes to write on it again.

Environmental and contextual conditions of use also play a decisive role. Temperature, humidity, salinity, and light conditions co-determine the suitability of certain technologies over others. This also applies to the broader context in which the act of writing occurs and the intended use of the manuscript: for example, whether one is writing while seated, standing, or on horseback; indoors or outdoors; on land or at sea, as well as whether the manuscript is meant to travel or remain in a library or archive. A clay tablet is typically cumbersome to transport and fragile to mechanical impact but can withstand fire remarkably well. Conversely, high atmospheric salinity has favoured the use of media such as wax tablets and notebooks with specially treated leaves to be inscribed using dedicated stone styluses, even in historical periods when paper was widely available and served as the standard medium under normal conditions.¹⁴

¹⁴ For the former case, see wax tablets still used in salt mines up to the early nineteenth century (see Section 4.2.4). For the latter, see the recent discovery of a previously unknown kind of erasable notebook, dating to the seventeenth century, among the Prize Papers of the National Archives in London, originally used in a naval context, now to be investigated by Marc Vermeulen and Katerina Williams (see a provisional insight by Peter Stallybrass at <<https://www.youtube.com/watch?v=GGhHdfTfEOo>>, minute 11).

2.2 Historical contexts

The conceptual framework developed within the Universität Hamburg's Centre for the Study of Manuscript Cultures for the comparative study of manuscripts from different cultures is a practical and well-tested tool for framing the historical contexts in which erasable manuscripts were produced and used. It considers four key factors: production, use, settings, and patterns.¹⁵ This framework is conducive to examining fundamental aspects of rewriting technologies within their historical contexts, particularly: the function that the act of erasure and rewriting served for the individuals performing this operation at the time it occurred (bearing in mind that the function of the rewritten manuscript may vary subsequently and for different actors); the availability of materials involved in the rewriting process (raw or processed, locally sourced or imported, with all associated economic implications); the know-how required for the involved manufacture and procedures; and the role of tradition.

Particularly complex, and prone to partial evaluations and anachronisms, are attempts to reconstruct the rationale behind the adoption of specific practices of reuse in past cultures. This complexity arises because a wide variety of factors influence the historical outcomes we reconstruct today, based on evidence that is incomplete at best, and badly fragmented in most cases. Among these factors, the influence of tradition is frequently underestimated. In many cases, tradition plays a significant role in the – more or less unconscious, and not rarely irrational – continuation of established practices, also often leading to the creation of imaginary etiologies. Primo Levi's memorable short story 'Chromium', from *The Periodic Table*, provides an excellent illustration of this process.

2.3 Three case studies: Clay, wax, and erasable coatings

Before the general availability of paper and graphite pencils, widespread writing technologies for reusable manuscripts included inkless writing on clay, wax, and ink and metalpoint writing on erasable coatings. These techniques represent three key case studies for exploring rewritability's role in premodern manuscript cultures for three main reasons.

Firstly, inkless writing on clay and wax are the only two widely used writing practices that allow for potentially infinite recycling of the manuscript without

¹⁵ Wimmer et al. 2015.

needing to add or remove any material. Even today, they may well be considered the ultimate rewritable media, as well as among the most sustainable and eco-friendly writing technologies available. In addition to these, coated tablets and sheets specifically designed for erasure and reinscription allow for practically endless reuse with minimal effort, thanks to the wide availability of the coatings' basic ingredients.

Secondly, these technologies played crucial roles in the history of writing. The Mesopotamian civilisation, which primarily practised clay writing, is one of the oldest and most influential in terms of writing practices. Wax tablets have been fundamental in Western writing history, transferred and adapted uninterrupted across periods, areas, and cultures from the ancient Near East through the ancient Mediterranean world and into early modern Europe. In ancient Egypt, coated wooden tablets played the same role that clay and wax tablets did in the ancient Near East: serving as notebooks and school exercise boards. From there, having passed through the Hellenistic, Roman, and Coptic Periods, they were adopted in the Islamic world and thus spread across a vast region, becoming, in the context of Qur'anic education, a symbol of knowledge and the Qur'an itself – an uninterrupted tradition that remains alive today in some West African countries (see Andrea Brigaglia and Dahir Lawan Mu'az's contribution to this volume). Rewritable coatings applied to wooden tablets, as well as to sheets of parchment and, later, paper, were among the most significant media used for ephemeral texts in Antiquity and later in the Middle Ages and Early Modern Period in Europe.

The final reason clay, wax, and erasable coatings represent key case studies for understanding rewritability's role is because practices of erasure and rewriting used for such inherently erasable, highly widespread media coexisted with several others. These others practices were adapted for supports that were more intractable to recycling, such as papyrus, parchment, and paper, as documented both by close examination of extant manuscripts and indirectly through textual and iconographic sources. Therefore, they represent important case studies for exploring the relation between writing media in manuscript cultures.

As part of this initial contribution towards a systematic and in-depth investigation of the role of reusability in the history of manuscript cultures, the next three sections aim to provide insight into these three fundamental rewriting technologies, considered from the perspective of their material fundamentals.

3 Clay tablets

Clay is widely available across the globe, has plasticity when wet, and becomes permanently hardened when fired: it is no surprise that it has always been a fundamental material in many human activities, including writing. After briefly presenting the variables at play and the main historically attested forms of writing on clay, this section focuses on the one form constituting a particularly relevant kind of rewritable medium, namely, the clay tablet.

3.1 Writing on clay

Among the most significant script carriers in history, clay allows for diverse methods of inscription.¹⁶ Key factors to consider include: (1) the chemical and mineral composition of the clay paste; (2) its physical state during inscription (in particular whether moist or dry); and (3) the writing techniques employed. The third factor, in turn, includes two crucial aspects: (1) whether writing techniques involve applying substances (such as ink, chalk, etc.) onto the surface, and (2) the biomechanics of the writing act, such as whether signs are scratched, impressed with a stylus, drawn or painted in ink, or created by impressing a matrix (as seen in seals and brick stamps).

Common occurrences of writing on supports made of clay include scratched and painted inscriptions on ceramic vessels, pottery sherds, and walls, found across multiple cultures. Two important concepts in this regard are *graffito*, which considers the writing technique as its point of reference (most often, graffiti are found on walls, rock surfaces, pottery sherds, and other surfaces not specifically prepared for writing), and *ostrakon*, which instead refers to the type of support – ceramic sherds or stone fragments, often limestone – where the text is inscribed in ink using a reed pen or another tool, or incised by scratching (in which case it also qualifies as a *graffito*).¹⁷ All these supports are rewritable to a certain extent – by smoothing in the case of graffiti, and by washing off the inscription in the case of ink writings. In the latter case, the ease of text obliteration depends on the porosity and composition of the surface as well as the type of ink used. Although the literature often emphasises that ostraca represented an almost unlimited and cost-free writing medium, numerous examples of palimpsest ostraca are known.

¹⁶ Balke et al. 2015; Faivre 2023b.

¹⁷ On graffiti and ostraca, see most recently Škrabal et al. (eds) 2023 and Caputo and Lougovaya (eds) 2021, respectively.

Considering that the more successful the erasure process, the harder it becomes to identify traces of the removed text without systematically applying advanced imaging techniques, it is reasonable to assume that the practice of reusing these supports was more common than generally thought.

Yet another technique of writing on clay offers even bigger opportunities for easy reuse of the script carrier, namely, writing without ink on moist, unbaked, and thus malleable, clay. This technique, enabling potentially infinite reuse without the need of adding or subtracting any material apart from the water needed to remoisten the manuscript, played a significant role in ancient societies, from the ancient Near East to Elam, the Bronze Age Aegean polities, and, to a much lesser extent, ancient Egypt.¹⁸ To be sure, the typical scripts, manuscript formats, and other specifics varied across historical contexts and writing traditions. Likewise, the role of clay manuscripts within each tradition differed significantly: in the ancient Near East, they were so essential and intimately bound to writing from its very invention that they shaped the entire character and development of scribal practices, whereas in Egypt they represent an isolated exception, confined to the Dakhleh Oasis and limited to a few centuries between c. 2350 and 2000 BCE.¹⁹

In all these traditions, clay coexisted with other manuscript materials, including wooden boards (coated or not), wax tablets, papyrus, and leather scrolls. Here again, the situation varied. Despite being contemporaneous and well acquainted with each other's writing practices, pharaonic Egypt and the ancient Near East remained for millennia true to their respective customary usages: in the former, the primary manuscript materials were papyrus and wooden boards, while in the latter, clay and wax predominated, with leather gaining increasing importance in the first millennium BCE. Particularly debated is the situation in the Bronze Age

18 The practice of writing on moist clay by incising signs on a tablet is attested, of course, in several other traditions, but with a quite marginal role (for ancient Greece, see Faraguna 2020, 118, n. 26).

19 Compact, articulated insights into the materiality of writing in the above-mentioned contexts are Taylor 2011a (ancient Near East); Basello and Ascalone 2018 (Elam); Quack 2005 (pharaonic Egypt); Finlayson 2013 (Bronze Age Aegean polities, but see Salgarella 2020 for the debated relation between texts in Linear A and Linear B). In Egypt, the use of clay as writing support is confined to the 'archive' of Balat (Dakhleh Oasis, approx. 350 km west of Thebes), where the use of clay tablets was arguably due to the unavailability of papyrus (Pantalacci 2021), and the Late Bronze Age diplomatic correspondence between the pharaoh and the ancient Near Eastern polities (Amarna archive and arguably comparable ones; see Hagen 2018, 136). As far as inkless writing on moist clay is concerned, the cuneiform writing tradition stands out for its antiquity, relevance in the history of writing, and the vast and diachronic nature of the existing evidence; see Streck 2010. Schnitzlein 2022 offers an extensive study in the Mesopotamian scribal culture, focused on the first millennium BCE.

Aegean, where leather, wood, and possibly palm leaves also played a role alongside clay as script carriers.²⁰

The quintessential format for clay manuscripts is the tablet. Thus, the clay tablet embodies the convergence of one of the oldest and most versatile forms of written artefact with one of the oldest and most versatile materials used by mankind, and as such it stands out as a pivotal manuscript technology. Within this category, various sub-formats exist, differentiated by shape, dimension, and orientation (from a few millimetres to over half a metre; rectangular, squared, rounded, globular, etc.; portrait, landscape), with some being characteristic of specific textual genres within a given tradition.²¹ Alongside tablets, other common formats within this manuscript class include cones, prisms, and cylinders, primarily found in the cuneiform world.²²

Within the broader category of inscribed clay objects, other crucial classes of inscribed artefacts, which, however, are not manuscripts, include clay sealings, bricks, and pottery bearing stamped inscriptions. Clay sealings, taking various shapes but most commonly the form of lumps used as stoppers, noduli, or cones suspended by cords, served as a fundamental means of communication, securing technology, and staple management in ancient societies. Whenever a seal impression (created by pressing on or rolling the seal, depending on its type) carries an inscription, the sealed object is to be considered an inscribed artefact. Similar considerations apply to mud bricks with stamped inscriptions, especially prevalent in the ancient Near East, and pottery with stamped potmarks.

3.2 Material, manufacture, inscription, and reuse of clay tablets

When speaking of clay tablets, the material should not be understood in the narrow sense given to it in the geosciences, where particle size is the main criterion for distinguishing clay from silt,²³ but as a generic reference to clayey mixtures, most often consisting of a matrix of clay and silt in varying proportions, mineral

²⁰ Waal 2024.

²¹ For example, so-called lentil tablets, easily held in the palm, are characteristic of elementary exercises in the initial stages of scribal education in Mesopotamia. So-called palm-leaf tablets are characteristic of Linear B corpora, in addition to page-shaped tablets (Salgarella 2020, 178–209; for the possibility that this format may hark back to the practice of writing on perishable palm leaves, see Waal 2022).

²² Taylor 2011a.

²³ But it should be noted that even here there is no full consensus among scholars. See Bergaya, Theng and Lagaly (eds) 2006; Thomas 2023.

inclusions, and frequently a tempering component of vegetable (e.g. straw) or animal (e.g. shell) origin.²⁴ Clay used in a particular tablet may have originated from a location far removed from where the tablet was discovered. Tablets were often transported over significant distances, and in some instances, the raw clay itself was moved from one place to another for processing. Therefore, one must exercise extreme caution when using material analysis results to draw implications about a tablet's place of origin. Petrographic and chemical analyses (see Section 3.3) highlight, on the one hand, the possibility of identifying regional clusters on the basis of specific compositional parameters, and, on the other, the variability in composition resulting from the natural variation of either clay deposits even within a limited geographical area or tablet preparation practices even in the same place and time.²⁵

Ancient sources provide scarce information about the origins and manufacture of clay manuscripts.²⁶ Consequently, reconstructing these processes mainly relies on archaeological evidence, close inspection of original manuscripts, material analysis, and experimentation.²⁷ Several factors governed tablet preparation techniques: quality and quantity of available raw materials (in some instances, clay was transported from afar, while in most cases it was locally sourced, ranging from fresh to ancient alluvial deposits); available know-how and traditional preferences, also related to local ceramic-processing practices; and the artefact's intended use.²⁸ Administrative tablets and drafts, for example, display a lower-quality fabric than tablets meant for long-term preservation and of particular value (Fig. 2). It is reasonable to assume that, as a rule, the primary process for preparing clay after collecting the raw mass involved levigation in dedicated pits, but the evidence also points to exceptions.²⁹ Archaeological excavations have yielded several examples of what can plausibly be identified as basins and pits

24 Taylor 2011b; Cartwright and Taylor 2011. In the ancient Near East, gypsum is also attested as a material of cuneiform tablets, although to a very limited extent. It has been speculated that it may have been used at a very early stage within the development of cuneiform writing when 'experimenting' with various materials; see Reade 1992. However, it is also attested in, for example, the Old Babylonian Period; see for instance the literary tablet Philadelphia, Penn Museum, UM 55-21-303, <<https://cdli.ucla.edu/P257245>>.

25 Comentale 2023; Spataro, Taylor and O'Flynn 2023.

26 Some information is available in ancient Near Eastern sources. See Civil 1998; Taylor 2011b; Torri 2020; van Buylaere, Watanabe and Altaweel 2019.

27 For Linear B tablets, see Judson 2023; Hruby and Nakassis 2024. For the ancient Near East, Taylor 2011b. For Balat, Pantalacci 2021.

28 Taylor 2011b; Spataro, Taylor and O'Flynn 2023 with literature.

29 See Spataro, Taylor and O'Flynn 2023, 68.

used for preparing tablets – in some cases, this interpretation is confirmed by the discovery of ‘blanks’ or ripped-up tablets ready for recycling, either inside or in close proximity to these pits.³⁰ It is equally reasonable to assume that, as a rule, the clay used for tablets was essentially the same as that used locally for pottery. This, too, often can be demonstrated through material analysis.



Fig. 2: A Hittite tablet fragment from the genre of the so-called cult inventories, displaying comparatively raw clay and large stone inclusions both inside and on the surface, typical of administrative tablets of ephemeral nature. Ankara, Anadolu Medeniyetleri Müzesi, Bo 73/s; photograph by the author.

The primary criterion in choosing clay mixtures and processing them into manuscripts was likely the plasticity of the material and the legibility of the written text. This, in turn, depended not only on the sharpness of the sign contours but also on the colour and texture of the surface: a uniform-coloured surface enhances legibility compared to one dotted with mineral inclusions. Similar considerations applied to the choice of whether to add temper, and the type of temper used. Recent analyses, referenced above, show that various techniques were used in preparing the tablets, both with and without levigation, addition of temper materials, and polishing. The

³⁰ See Taylor 2011b; Faivre 2023a, and the contributions by Cécile Michel and Jon Taylor to this volume. For an illuminating example from Tell Khaiber, see the section by Eleanor Robson in Campbell et al. 2017, 28–30.

modelling process also varied, with some artefacts having a uniform matrix, while others feature a finer clay ‘skin’ enveloping a coarser core.

Cuneiform was typically written with a reed stylus cut at a sharp angle, enabling wedge-shaped impressions into wet clay.³¹ Our term ‘cuneiform’ follows the first modern description of this type of writing, which Thomas Hyde provided in 1700 in his work *Historia Religionis Veterum Persarum* in reference to Achaemenid monumental inscriptions: ‘ductuli pyramidales seu cuneiformes’ (‘pyramidal or wedge-shaped marks’).³² The highly pronounced three-dimensionality of this script makes it a prime subject for quantitative palaeographic analysis based on the geometry of the impressions that form its fundamental elements³³ and has non-trivial implications for legibility (as anyone who has had to collate cuneiform tablets knows, they are best read with a light source coming obliquely from the upper left). The use of a reed stylus, arguably of the species *Arundo donax*, is typical of the core area of the ancient Near East, roughly corresponding to present-day Iraq and Syria. Remarkably, for over 3,000 years, the reed stylus was consistently impressed in such a way that the right face of the wedge was produced using the part of the stylus corresponding to the outer skin of the reed, giving it its characteristic curvature. In Hittite Anatolia, however, where the colder climate did not support the growth of giant reed, styluses were likely made of bone. As a result, the wedge faces on Hittite cuneiform tablets are all perfectly flat.

In contrast, linear scripts like Linear Elamite, Hieratic, Aramaic, and Aegean linear scripts, when on clay, required pointed-end styluses made of metal, wood, or bone.³⁴ Here as well, careful examination of the written traces can reveal significant information about writing tools – now almost entirely lost – and the way they were used to produce signs, particularly whether they were made by impression or by dragging the stylus along the surface.

Since clay gradually dries in the open air, the time available to the scribe to write on a moist clay tablet is limited, unless specific measures are taken to extend this period. This can be done by keeping the tablet wrapped in a damp cloth or remoistening sections that have become too dry to be inscribed. This phenomenon is precisely what is observed in original documents: variations in the appearance of strokes within different portions of the same manuscript that were arguably written

³¹ Cammarosano 2014; Devecchi, Müller and Mynářová (eds) 2015. For a quick overview, see <<https://cuneiform.neocities.org/CWT/howtowritecuneiform>>.

³² Hyde 1700, 526.

³³ Cammarosano 2015.

³⁴ See Pantalacci 2021 for the Hieratic tablets from Balat. See Steele 2020 and Steele and Boyes 2023 for the Aegean scripts.

at different times (with intervals ranging from hours to, depending on humidity and temperature, even minutes); signs of localised remoistening in larger manuscripts to facilitate the inscription of the final sections; and various techniques to update or modify the text once the tablet had already dried. Jon Taylor's contribution to this volume offers a systematic and in-depth study of all these aspects.



Fig. 3: A clay tablet from Balat, Dakhleh Oasis, Egypt, Old Kingdom, inscribed in Hieratic. Note the erased portion on the left, with traces of previous writing. Cairo, Egyptian Museum, Tablet IFAO no. 6163, NU_2006_1985; photo courtesy Laure Pantalacci / IFAO.

As long as the clay remains malleable, one of the defining characteristics of clay tablets – directly stemming from their being inscribed without ink and from the material's plasticity – is the remarkable ease with which corrections can be made. Existing signs can be effortlessly erased by simply smoothing the surface with a finger or another suitable tool, allowing immediate rewriting (Fig. 3). The extent to which erasures remain visible depends on how thoroughly the surface has been smoothed. In many cuneiform tablets, scribes often did not bother to flatten the surface at all, simply impressing new signs over the previous ones. It is generally assumed that any erasure leaves at least minimal traces due to the inevitable

compression of the clay mass in that area, though this has yet to be systematically investigated through experimental research. Regardless, the countless erasures observed in cuneiform tablet corpora – and in other writing traditions that used clay – constitute an invaluable source of information about scribal practices, conventions, and broader aspects of manuscript cultures, many of which remain to be systematically explored.³⁵

Another open question that still awaits thorough investigation concerns the extent to which ‘localised remoistening’ may have been employed (see again Cécile Michel’s contribution to this volume). A related but distinct issue, also tied to the reusable nature of clay tablets, is the complete recycling of a manuscript. This could be achieved by soaking the tablet in water until the surface became malleable again and thus could be smoothed, or by fully reworking the clay and reforming the manuscript from scratch. In the cuneiform world, we have both textual and archaeological evidence for these practices, which were likely particularly common in contexts of intensive ephemeral text production, such as scribal education. A Neo-Babylonian tablet, probably a model for school colophons (Baghdad, Iraq Museum, U.3018), instructs students to ‘crumble’ their completed exercise tablets into the ‘tablet container’: as noted by Enrique Jiménez, ‘this practice would account for the fact that school tablets with colophons are relatively few, particularly considering that each scribe must have made several of them during his apprenticeship’.³⁶ Similarly, typical Old Babylonian school tablets often exhibit clear traces of repeated erasure and rewriting: while one column, containing the master text, was left intact, the column used for exercises was frequently erased and reinscribed (Fig. 4).³⁷ In some cases, when the clay had already dried, the exercise column was scraped rather than smoothed, resulting in its gradual thinning over time (see Jon Taylor’s contribution to this volume, with literature), and, more generally, secondary inscriptions could be added after the clay had dried using various techniques, such as adding a scratched or painted inscription, or both.³⁸ But how widespread was the recycling of tablets? Scholarly opinions vary: some argue for a minimalist view, given the virtually inexhaustible availability of clay, particularly in the Mesopotamian alluvial plains, while others suggest that tablet recycling was a routine practice.³⁹

³⁵ Delnero 2024; Cécile Michel’s contribution to this volume.

³⁶ <<https://www.ebl.lmu.de/fragmentarium/U.3018>>.

³⁷ Robson 2001; Veldhuis 2014.

³⁸ Fales et al. 2005; Taylor 2011a.

³⁹ See, respectively, Taylor 2011b and Faivre 2023a, both with extensive previous literature. For Linear B tablets, see Hruby and Nakassis 2024.



Fig. 4: Obverse of an Old Babylonian cuneiform clay tablet from Nippur, inscribed with school exercises. On the right side, one or two columns were (imperfectly) erased by the scribe when the surface was still moist, as was customary in order to practice there again. Chicago, IL, Institute for the Study of Ancient Cultures Museum, A30276; courtesy of the Institute for the Study of Ancient Cultures of the University of Chicago; photograph: Danielle Levy.

Firing the clay at high temperatures induced permanent changes in its physical and chemical properties, rendering it unable to become plastic again by adding water. Importantly, *fired* and *unfired* represented two ends of a continuum, dependent on temperature and firing method.⁴⁰ Some tablets were intentionally baked in ancient times to prevent modification, particularly copies of documents with legal value, while others were baked accidentally due to building conflagrations. Some were also baked at the time of discovery or later to prevent deterioration, although this end was not always achieved.⁴¹ As already mentioned, fired clay – that is, ceramics – is highly suitable for use as a writing material, both with ink and by incising, with the added possibility of smoothing or washing the surface for reuse.

3.3 Material analysis of clay tablets

Several methods, both destructive and non-destructive, can be applied in studying clay written artefacts:

- Optical microscopy and reflectance transformation imaging (RTI) help in observing the texture and details of the artefact, and can be employed for enhancing legibility in the process of text edition.
- 3D (laser or structured-light) scanning enables precise measurement of the artefact's geometry, including sign components.
- Thermoluminescence dating can be used to determine the date of firing, but a larger sample is required.
- Several elemental and isotopic techniques can be used (including in combination) for determining the composition of the material and of pigments that may be present on the surface. Some of these techniques also can be used for the optical study of volumetry, morphological micro-structure, or micro-flora and micro-fauna that may be present, and X-ray computed tomography enables the reading of tablets enclosed in a clay envelope, without breaking the latter).⁴²

⁴⁰ Reade 2017.

⁴¹ See Reade 2017 and Gütschow 2012, as well as Carmen Gütschow's contribution to this volume.

⁴² Spataro, Taylor and O'Flynn 2023 with literature and discussion.

4 Wax tablets

Wax tablets represent one of the most impactful and long-lasting writing supports in history. This is due to the unique characteristics of their fundamental component, beeswax, particularly its chemically stable nature, its high plasticity at room temperature, and, at the same time, its considerably higher melting point compared to naturally available animal and vegetable fats.

After a brief overview of wax's role as a support for the written word, this section discusses the characteristics of wax-based mixtures in relation to their use as a writing support, outlines the history of the wax tablet as a rewritable medium, and finally presents the methods of investigation applicable to the study of preserved original specimens.

4.1 Writing on wax

The use of wax (mixtures) as a writing surface is first attested in the twenty-first century BCE through direct evidence in Middle Kingdom Egypt and around the same time through indirect evidence in southern Iraq (Ur III Period). In Egypt, the context is that of wax figurines, which were sometimes provided with inscriptions, inked either directly on the wax surface or on plaques then applied onto the object.⁴³ Inscribed wax objects are known from several other periods and cultures. In Mesopotamia, the context is the invention of wax tablets, which are dealt with in Section 4.2. The third major context for the use of wax as a writing surface is sealing practices. The earliest evidence of wax mixtures used as sealings – that is, as the recipient of seal impressions – dates from ancient Egypt (fifteenth/fourteenth-century BCE Egypt, eighteenth dynasty),⁴⁴ but became widespread only in Late Antiquity and the Middle Ages.⁴⁵ When wax sealings bear an inscription, they configure written artefacts, albeit not manuscripts.

Waxes are lipid materials characterised by esters of long-chain carboxylic acids, solidifying at room temperature and exhibiting high hydrophobicity. Natural waxes stem from animal (beeswax, Chinese wax, lanolin, spermaceti), vegetable (carnauba, candelilla wax, esparto wax, Japan wax), and fossil (paraffin wax, montan wax, ceresin) sources.⁴⁶ Throughout history, waxes have served various

⁴³ Raven 1983.

⁴⁴ Hayes 1990, 209.

⁴⁵ Becchetti 2011; Kasso et al. 2023.

⁴⁶ Colombini and Modugno 2009, 10–12.

purposes, including as sealants, coatings, polishes, balms, and cosmetics, as well as in lost-wax casting, candle production, encaustic painting, ceroplastic art, and writing tablets.⁴⁷ Beeswax, exploited since the early Neolithic,⁴⁸ stands out as the principal type of wax documented as a support for writing. Indeed, it constitutes the fundamental component of the wax paste in wax figurines, wax tablets, and wax sealings.⁴⁹

An excretion from honeybee glands, beeswax forms as wax scales on the bee's abdomen, later shaped into honeycombs using their mandibles (Fig. 5). Wax colour can be affected by pollen and cuticula incorporation. Obtaining beeswax involves extracting honeycombs and separating wax from honey through heating and filtration. Chemically, beeswax is a mixture of monoesters, hydrocarbons, diesters, hydroxy polyesters, and a large variety of further compounds.⁵⁰ It melts between 62 and 65°C. Esters, mainly myricyl palmitate, dominate the composition (70 per cent).



Fig. 5: A construction bee taking wax scales from a nest mate with its mandibles. From Tautz and Heilmann 2007, 158, fig. 7.2; reproduced with permission.

⁴⁷ Büll 1977.

⁴⁸ Roffet-Salque et al. 2015.

⁴⁹ Carnauba wax was occasionally used for producing sealings in the Modern Period; see Šoltys et al. 2019.

⁵⁰ Hepburn et al. 2014, 16; Fröhlich 2000.

A wax paste suitable for writing needs to strike a delicate balance between softness (to enable inscription and erasure) and hardness (for text stability).⁵¹ This optimal equilibrium is not fixed but hinges on the script's nature, specific text requirements, and environmental constraints. Mechanical properties rely on environmental temperature, beeswax quality, and added substances. Pure beeswax's stickiness and translucent colour deem it unfit as a writing surface, prompting the addition of other substances with a triple purpose: adjusting consistency and plasticity, influencing colour, and increasing cost-effectiveness through blending with more common materials. While numerous extant specimens of wax tablets and historically attested recipes involve multiple ingredients, a single substance, such as ochre or carbon, can achieve all these objectives.⁵²

Philological sources and scientific analyses provide insights into the diverse substances incorporated into beeswax for inscribed figurines, writing tablets, and sealings throughout history. Evidence from ancient Egypt shows the addition of resins, oils, and pigments.⁵³ Ancient Near Eastern evidence is restricted to yellow ochre, arsenic sulfide (orpiment), possibly soot, and potentially (sesame) oil (see Section 4.2.2). In contrast, evidence from Antiquity and the Middle Ages and Early Modern Period reveals a more extensive list of additives in various proportions and combinations, including oils, resins, turpentine, dairy products, honey, ochre, charcoal, soot, copper acetates (verdigris), cinnabar, red lead (minium), azurite, and basic lead carbonate (white lead).⁵⁴ The colour of the resulting paste depends on the added ingredients, ranging from golden and ochre hues to black, red, green, and even blue. Textual evidence confirms that the wax paste's colour played an important role in determining the written text's legibility, which resulted from contrasting patterns of light and shadow within the wax layer.⁵⁵ The variable composition of both wax tablets and sealings testifies to complex patterns of knowledge transfer, intersections with other wax-related processes, and culturally conditioned preferences, which remain poorly understood.

The plasticity criteria for sealings differ from those for wax tablets, as the former are intended to remain stable over time once impressed, while the latter

⁵¹ Büll 1977, 785.

⁵² Cammarosano et al. 2019, 156–157.

⁵³ Büll 1977, 808–814, concerning wax tablets from Roman Egypt; Serpico and White 2000, 420–422.

⁵⁴ Büll 1977, 796–820; Oltrogge in Bartl et al. (eds) 2005, 658–662; Weirauch and Cammarosano 2021, 19–21.

⁵⁵ Weirauch and Cammarosano 2021, 13–15 with literature. On the link between background colour, writing technique, and legibility see Section 4.2.3, regarding the case of Roman wax tablets.

as a rule aim for easy erasability. Therefore, individual examples of inscribed wax mixtures are unique and should be treated accordingly.

4.2 Wax tablets in manuscript cultures

4.2.1 The wax tablet as medium

Wax tablets, composed of one or more leaves typically made of ivory or wood, feature a framed recess housing a beeswax-based paste to be inscribed with a stylus, normally made of metal or bone.⁵⁶ The recesses are regularly scored with a criss-cross hatching to enhance the wax layer's grip, and the writing marks are impressed (in the case of cuneiform) or scratched (linear scripts) into the wax paste with the stylus. The stylus's tip is shaped according to the script to be produced: squared for cuneiform,⁵⁷ pointed for linear scripts.⁵⁸ Erasing is easily done with a spatula or globular tip, most often incorporated on the back end of the stylus, enabling immediate or delayed reinscription. Thanks to the chemical stability of beeswax, the wax paste in principle could be reused indefinitely. In practice, however, accumulated dust and impurities over time made it advisable to periodically renew the wax layer. Not infrequently, a too thin layer of wax or excessive pressure on the stylus caused it to cut into the wood, producing incised traces, which were subsequently hidden when a new layer of wax was added. As a consequence, in many instances multiple layers of written traces survive on top of each other, complicating decipherment.⁵⁹ This writing technology, providing an ink-free and highly portable surface, endured for nearly four millennia, crossing cultures and historical periods, and was still in use in nineteenth-century Europe. The earliest precursor to the modern book in codex form,⁶⁰ the wax tablet stands as one of the longest-lasting manuscript forms in history (Fig. 6).

⁵⁶ Büll 1977, 785–894.

⁵⁷ Cammarosano et al. 2019.

⁵⁸ Gerlach 1965; Schaltenbrand-Obrecht 2012.

⁵⁹ Mullen and Bowman 2021, 72–85.

⁶⁰ Boudalis 2018, 21–34.

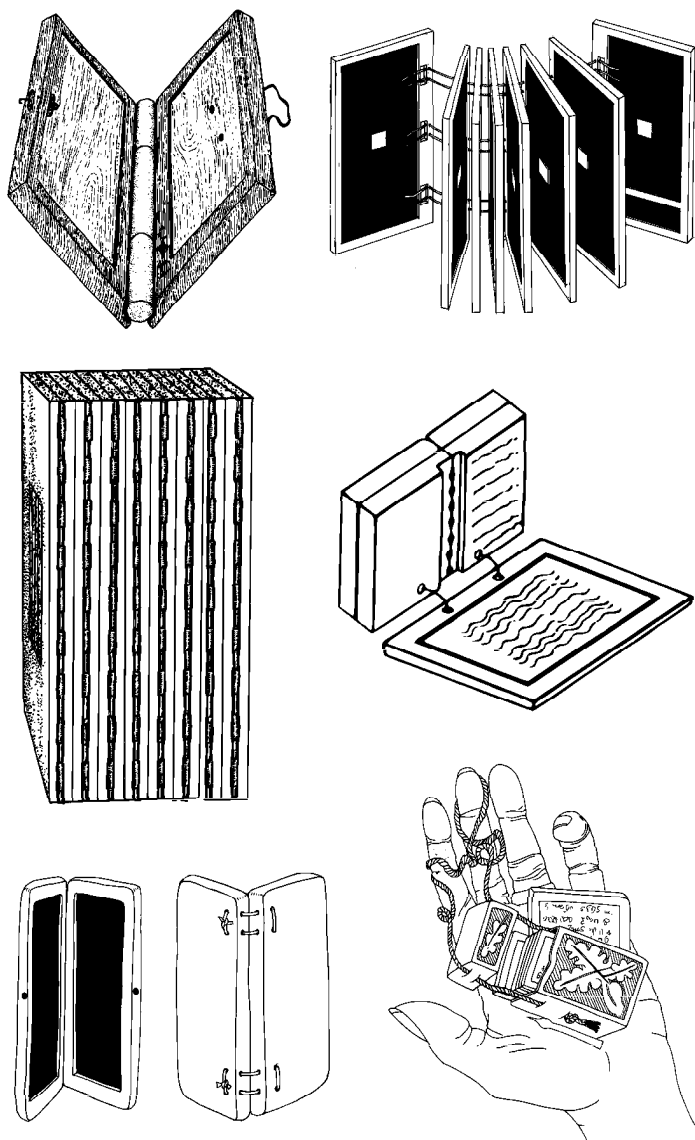


Fig. 6: Exemplary types of wax tablets (not to scale). From top to bottom and from left to right: reconstruction of the wooden diptych from Uluburun, 14th c. BCE (from Payton 1991, fig. 4); a Roman octoptych from Herculaneum, 1st c. CE (from Boudalis 2018, 25, fig. 11); reconstruction of the ivory polyptych from Nimrud, 8th c. BCE (adapted after Howard 1955, 17, fig. 9); the structure of Roman triptychs with legal text (from Camodeca 2022, 22, fig. 2); reconstruction of a method for connecting the two leaves of a diptych (from Boudalis 2018, 25, fig. 10); set of wax tablets in their leather pouch, from York, 14th c. CE (from O'Connor and Tweddle 1992, 322, fig. 11).

4.2.2 Wax tablets in the ancient Near East

The wax tablet as an invention must be credited to the cuneiform manuscript culture of ancient Mesopotamia (modern-day Iraq and Syria).⁶¹ The earliest evidence of wax writing tablets dates back to the late third millennium BCE (the Ur III Period) and is found in cuneiform clay tablets from southern Iraq referring to the use of wax tablets in administrative procedures and bookkeeping. We have no information on the exact composition of the wax mixture used in this context, but it is reasonable to assume that the main ingredient was beeswax, as preliminary experiments and practical considerations suggest that possible substitutes – particularly tallow – do not yield satisfactory results for imprinting wedges. Given the climatic conditions of Lower Mesopotamia, the beeswax necessary for preparing these tablets, as well as for other documented uses in the same period – particularly the lost-wax casting technique – had to be imported from the mountainous regions to the east and north.⁶²

As discussed in Section 3, at this time Mesopotamian scribal cultures already had a writing technology that was both readily available and highly suited to reusing the writing surface – namely, clay tablets. It is therefore not a trivial question as to why these same cultures felt the need to adopt wax, alongside clay, as a writing support. The answer likely lies in three distinctive features of wax tablets, which offer significant advantages over their clay counterparts:

1. The ability to correct and update the text over an indefinitely long period without any preliminary operation, unlike clay, which requires remoistening once dried. This makes wax tablets particularly suitable as a support for texts requiring periodic updating, as is often the case in bookkeeping.
2. Greater resistance to mechanical shock compared to clay, and a lower specific weight – both characteristics that make wax tablets easier to transport over long distances.
3. The possibility of binding multiple leaves together to create polyptychs capable of holding significantly longer texts within a single manuscript than possible on clay tablets (the polyptych from Nimrud constitutes a good example of this, discussed later in this subsection).

⁶¹ The following outline summarises the results presented in Cammarosano et al. 2019, with selected bibliographical notes. The most recent literature includes Molina and Steinkeller 2023 and Zimmermann 2023.

⁶² Recently, it has been hypothesised that the technology of wax tablets was originally developed further north, in northern Mesopotamia; see Reade 2024.

The available evidence, mostly indirect (textual and iconographic), becomes more abundant in the second millennium BCE, showing that wax tablets were used throughout the cuneiform world and for a range of different text genres, both documentary and literary (Fig. 7). Particularly significant in this period is the extensive evidence from Hittite Anatolia. In this context, in addition to a significant number of textual references – pointing, among other contexts of use, to wax tablets as *aides-mémoire* for the correct performance of festive rites – we also have more than thirty bronze styluses, found at multiple sites, featuring a pointed writing tip on one end and a spatula on the other, fully analogous to those known from the classical and medieval periods. These tips show that wax tablets were used not only for cuneiform but also for the indigenous linear script known as Anatolian hieroglyphs, and furthermore suggest that wax tablets may have been the primary medium for economic administration in the Hittite state – a hypothesis that could explain the striking absence of economic texts from the Hittite record.⁶³



Fig. 7: Left: A portion of the preserved wax layer inscribed in cuneiform from the Nimrud ivory polypych, London, British Museum, BM 131952. Right: Detail from the Neo-Assyrian wall panel BM 124955 (Nineveh, South West Palace, 7th c. BCE) showing two scribes recording booty, one writing arguably in Aramaic on leather, the other in cuneiform on a wax diptych; © The Trustees of the British Museum.

⁶³ Cammarosano 2024, for the textual evidence; Cammarosano 2025, for the bronze styluses.

The oldest surviving examples of wax tablets – the well-known diptychs from the Uluburun shipwreck – date to the fifteenth century BCE (Fig. 6).⁶⁴ Since the wax layer has not survived, it is impossible to determine which script(s) were used on these specific examples, and the interpretation of the incised marks on their edges remains highly debated.⁶⁵

Wax tablet use in the ancient Near East appears to have further increased in the first millennium BCE, particularly during the Neo-Assyrian and Neo-Babylonian Periods. A relief from the island of Qal'at 'Ana in the Middle Euphrates, dated to the eighth century BCE, suggests that this medium was also used for Aramaic, and numerous indirect sources document that a significant portion of entire libraries consisted of wax tablets, the most striking example being the library of Ashurbanipal. The eighth century BCE also saw the creation of the only other known surviving examples of ancient Near Eastern wax tablets: two sets of polyptychs from the palace of the Assyrian king Sennacherib at Nimrud (one in ivory and one in walnut wood – the ivory set featuring leaves 34 cm tall bound in concertina format; Figs 6–8), and two diptychs from another Assyrian capital, the city of Assur (two ivory diptychs with leaves 8.3 and 14.7 cm tall, respectively).⁶⁶

Some fragments of the Nimrud polyptychs still preserve part of their wax coating, partially still inscribed with cuneiform signs. This is especially evident in the ivory set, which displays a paste of bright-yellow colour and contains a part of the astronomical omen series *Enūma Anu Enlil*. According to analyses performed in the 1950s, this paste is made of beeswax compounded with 25 per cent orpiment (As_2S_3 , arsenic sulfide). A recent analysis conducted at the British Museum, London, confirms that a detached sample of wax paste, presumably originating from the ivory set, is composed of beeswax and orpiment, while traces of matter newly identified on fragments of the wooden set hint at the presence of a mixture of beeswax and soot, thus resembling a wax recipe that would later become standard in the classical world.⁶⁷ Finally, references to the supply of beeswax and yellow ochre (Akkadian: *kalū*) 'for the wax tablets', found in Neo-Babylonian economic receipts suggest that these were ingredients commonly used in that context and possibly more generally in ancient Mesopotamia for ordinary wax tablets,

⁶⁴ In truth, only one of the two is well known – the better-preserved example, on display at the Bodrum Museum of Underwater Archaeology in Turkey; see Payton 1991, with additional information provided in Cammarosano et al. 2019, 148–150.

⁶⁵ See most recently Waal and Dillo 2021.

⁶⁶ See Howard 1955 and Cammarosano et al. 2019, 151 for Nimrud; Jendritzki, Streckfuß and Cammarosano 2019 for Assur.

⁶⁷ Tamburini et al. 2025.

while the presence of orpiment in this Assyrian royal collection can be explained by a desire to imitate the colour of gold.⁶⁸

Since wedges are produced simply by pressing a squared tip into a moist surface, the same stylus can be used to write cuneiform on both clay and wax. However, iconographic sources reveal a curious difference in the appearance and handling of styluses associated with wax boards compared to those used for clay tablets. While both are of rectangular or trapezoidal shape, styluses for wax boards display what appears to be a longitudinal line or groove, whereas styluses for clay tablets do not. Whether this feature is merely an iconographic convention or reflects a technical adaptation for writing cuneiform on wax remains an open question.⁶⁹



Fig. 8: One of the sixteen leaves of the ivory polyptych from Nimrud. Baghdad, Iraq Museum, IM 56967; photograph by the author.

4.2.3 Wax tablets in the classical world

Via the Levant, the technology of wax tablets spread from the Near East to the Mediterranean basin. As Laura Boffo and Michele Faraguna have recently reaffirmed,

In the process of receiving and reworking the *phoinikeia grammata*, the Greeks did not simply learn a technique (or a ‘technology’) whose utility was perceived or intuitively understood

⁶⁸ Cammarosano et al. 2019, 153–154, 162–166.

⁶⁹ Cammarosano et al. 2019, 158–168.

in the abstract. Instead, through close and prolonged contact with the ‘Phoenicians’ (a term that also includes Arameans and Levantines), they became familiar with a complex of social practices, of which writing was, in fact, only one element (though, in retrospective evaluation, certainly the most important one).⁷⁰

It is therefore virtually certain that the Greeks encountered wax tablets at the same time as they came into contact with other writing materials used in the broadly defined ‘Phoenician’ world, including perishable ones such as papyrus, leather, and wood.⁷¹ Indeed, the Greek word for wax tablet, δέλτος (*déltos*), has been argued to be a Semitic loanword ultimately deriving from Akkadian *daltu* (‘door’), which was used metaphorically to refer to the leaf of a waxed board book.⁷²

The large body of evidence available for wax tablets in the classical world includes texts, iconographic sources, and material culture, with approximately 2,600 known extant (fragments of) tablets and hundreds of styluses. However, their distribution is highly unequal. While textual and iconographic sources are available, albeit at different rates, for the entire span of time from archaic Greece to late imperial Rome,⁷³ surviving examples of wax and wooden tablets for the archaic and classical Greek periods are extremely rare (the wax tablets from Tomb II in Daphni, dated to the fifth century BCE, constitute an exceptional case; in Egypt, specimens written in Greek prior to the second century BCE are very rare). For the Hellenistic and Roman Periods, examples are mostly concentrated in a few well-defined contexts, in which particular environmental conditions allowed the conservation of wood: Hellenistic, Roman, and Coptic Egypt; the Vesuvian sites (Pompeii, Herculaneum, Puteoli, first century CE); and the corpora of Roman wax tablets from Dacia (second century CE), Vindonissa (first century CE), and Roman Britain (first/second centuries CE, mainly from London and Vindolanda; at the latter site, besides approximately 340 wax tablets we have around 1600 uncoated

70 Boffo and Faraguna 2023, 61 with n. 1 (my translation).

71 See again Boffo and Faraguna 2023, 63–68 for a clear and dense elaboration of the issue, with an updated and critically discussed bibliography. On pages 29–57, the authors offer an illuminating methodological discussion on the usefulness of comparing writing and archiving practices in the Greek world with those of the Near Eastern world.

72 Boffo and Faraguna 2023, 64–65, n. 21.

73 For terminology and contexts of use based on written sources, see Degni 1998; Ammirati 2013. For iconographic sources, Büll 1977, 821–829; Meyer 2009; Meyer 2023; Hartmann 2023. See furthermore the essays collected in Lalou (ed.) 1992b, 61–230. For a convenient overview, see Willi 2021, 49–55, 76–81.

wooden leaves – *tilia* – written in ink).⁷⁴ A particular case is that of the *Tablettes Albertini* from Djebel Mrata in south-eastern Algeria, dated to the fifth century CE during the Vandal reign, documenting the practice of reusing wooden tablets several times for writing in ink.⁷⁵ In addition to these main corpora of tablets, a considerable number of smaller corpora and isolated specimens come from the most varied areas of the Roman Empire.⁷⁶ Finally, there are the thousands of styluses for wax tablets, of metal but also of bone, and related accessories (spatulas, etc.).⁷⁷

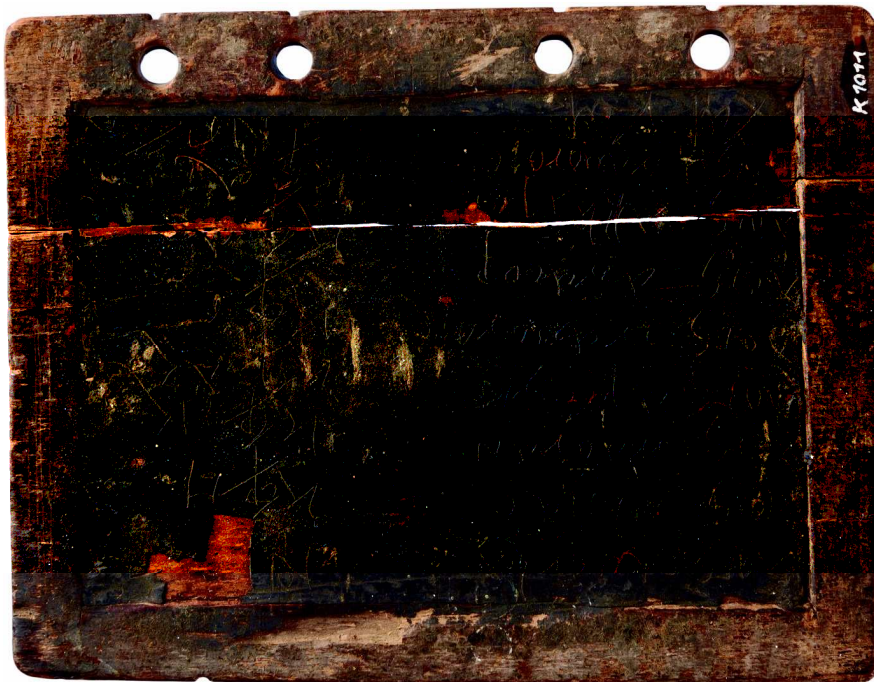


Fig. 9: Leaf from a Coptic wax book used in schooling, from Egypt, 5th c. CE (Würzburg, Martin von Wagner Museum, K1011, board 3); © Martin von Wagner Museum der Universität Würzburg; photograph: Christina Kiefer.

⁷⁴ Major publications: Egypt: Brashear and Hoogendijk 1990; Pompeii: *CIL* IV Suppl.; Herculaneum: Camodeca 2017; Puteoli: Camodeca 1999; Dacia: *CIL* III/2; Vindonissa: Speidel 1996; Roman Britain: several, aptly listed and searchable at the Roman Inscriptions of Britain online database at <<https://romaninscriptionsofbritain.org/>>.

⁷⁵ Courtois et al. 1952.

⁷⁶ Useful catalogues are in Bartoletti and Pescini (eds) 1994; Hartmann 2015.

⁷⁷ See recently Božić and Feugère 2004; Schaltenbrandt-Obrecht 2012; Willi 2021 with literature.

Wax tablets – commonly referred to in Greek as δέλτοι (*déltoi*) and in Latin as *tabulae ceratae*, *tabellae*, *cerae*, or *pugillares* – played a fundamental role in the writing practices of the Greco-Roman world, where they embodied the quintessential rewritable medium.⁷⁸ A symptom and consequence of this is their use as a metaphor for the human mind and memory – a metaphor attested as early as Aeschylus, and one that would persist in Western thought all the way to Sigmund Freud.⁷⁹ As is well known, wax tablets played a central role in the development of the parchment codex, thus having a decisive impact on a crucial aspect of the history of Western written culture.⁸⁰

The ease with which wax tablets could be corrected and rewritten – by smoothing the surface with a spatula or another appropriate tool (Latin: *planare* ('to flatten'), on which see Serena Ammirati's contribution to this volume) – made them a privileged medium for taking notes and drafting compositions in progress. This, in turn, underscores their central role in literary composition processes.⁸¹ For the same reason, they were widely used in educational contexts, especially in the Roman world, with important consequences for the development of individual handwriting that remain to be fully understood (Fig. 9).⁸² Few palaeographers have reflected on the possible interaction between 'scratched' writing and ink writing in particular contexts.⁸³ Marc Smith has argued for wider-ranging, long-term effects of the technique, suggesting that the parameters of moving a stylus on wax contributed to the formation of Old Roman Cursive and that a partial shift from wax to papyrus in the second and third centuries CE helps explain the relatively sudden transition to the more fluent New Roman Cursive. Smith's hypothesis is based on experimental observations and on a parallel with the later and better documented transition, around 1300, from wax to paper, associated with comparable technical effects on cursive handwriting.⁸⁴

78 Further kinds of 'erasable manuscripts' that were widely used in Antiquity were lead sheets (incised), coated wooden tablets (large and small, inscribed with ink or paint), and uncoated wooden tablets and sheets (the latter also known as *tilia*; either incised or written with ink or paint).

79 Sigmund Freud's well-known essay on human memory, 'Notiz über den „Wunderblock“' (1925), was inspired by a peculiar kind of wax tablet. On the wax tablet as metaphor for the human mind, see Small 1997; Julião et al. 2016; Agócs 2019.

80 Boudalis 2018, 21–34; see also his contribution to this volume.

81 Small 1997; Dorandi 2007; Pecere 2010; Del Corso 2016. The interaction between memorisation, orality and writing in textual composition is especially debated for archaic Greece; see Spelman 2019.

82 Cribiore 1996; Fioretti 2010.

83 Fioretti 2010, for Antiquity; Rouse and Rouse 1989b, 183–186, for the Middle Ages. See also Mullen and Bowman 2021, 41–42.

84 Smith 2003.

The ability to write without the need for ink and inkwell also gave wax tablets an advantage for writing outdoors and during travel. However, they were not used solely for drafting ephemeral texts. In the Roman Imperial Period, for example, they served up to the third century CE as the mandatory support for certain types of legal documents, such as contracts and testaments. The well-known *Senatus Consultum Neronianum* of 61/62 CE specifically prescribed special sealing and closure methods to prevent tampering and forgery of such documents.⁸⁵

The different uses and contexts of wax tablets are reflected in the variety of their dimensions, their number of leaves, the techniques used to manufacture and join them, their closure and sealing mechanisms, and possible accessories, like the detachable stylus holders investigated by Georgios Boudalis in his contribution to this volume.⁸⁶ This diversity also extends to the materials, types, shapes, and sizes of the styluses that were the tablets' indispensable companions.⁸⁷ In many cases, wax tablets contained not only text inscribed with a stylus on the waxed surfaces but also inked writing on the outer pages (*scriptura exterior* or *ad atramentum*) or even along the edges, a fact that underscores their nature as a composite and complex manuscript form. Finally, a special type of wax tablet is the ivory consular diptych, widespread especially in Late Antiquity for ceremonial use.⁸⁸

Greco-Roman wax tablets can be studied from multiple perspectives. While the fundamental task of reading and interpreting the traces of writing still present on them is primarily a palaeographic (or, if preferred, epigraphic) and philological endeavour, their study as artefacts requires a multidisciplinary approach. Ideally, this involves a combination of material analysis, codicological-technological examination, replication and experimentation, and consideration of available textual and iconographic sources. In this regard, it is worth emphasising that the critical editions and catalogues cited in the foregoing have been compiled from a philological perspective and therefore generally consider only those specimens that still bear traces of writing. In fact, no comprehensive repertory compiled from a material perspective has been published so far.⁸⁹

⁸⁵ Camodeca 2022.

⁸⁶ Federici, Mita and Pezzano 1989 and Goodburn and Humphreys 2016 are among the few studies dealing with the techniques of manufacturing wooden wax tablets. Also see the ongoing project 'The Making of the Vindolanda Wooden Writing Tablets' at the British Museum, under the lead of Caroline Cartwright and Richard Hobbs (<<https://www.britishmuseum.org/research/projects/making-vindolanda-tablets>>).

⁸⁷ Schaltenbrandt-Obrecht 2021; Willi 2021.

⁸⁸ Büll 1977, 792–795; David (ed.) 2007; Cameron 2013, all with previous literature.

⁸⁹ A database including the corpora from Vindolanda, London Bloomberg, Velsen I, Vechten, Valkenburg, Vindonissa, and Tasgetium has been compiled by Anna Willi in the frame of her

Similar considerations apply to the reconstruction of writing techniques. The composition of wax mixtures can be investigated through the analysis of preserved residues. Some specimens from Egypt have particularly well-preserved wax layers, as does the corpus of the *Tabulae Sulpiciorum*, though wax residues also appear in various other corpora in scattered specimens. Further insights can be drawn from textual sources and iconographic evidence, which are particularly useful for understanding the range of colours attested for wax mixtures. The standard base ingredient was consistently beeswax, most often mixed with soot or charcoal. Textual sources and archaeological reports also indicate the existence of tablets with a red-coloured wax layer, and special preparations are mentioned in textual sources.⁹⁰ The presence of resins, identified in analyses conducted in the 1970s by Reinhard Büll, still requires thorough investigation, as does the problematic case of the *Tabulae Sulpiciorum* from Puteoli near Pompeii, in which the mineralogist Selim Augusti has claimed shellac instead of beeswax was used – an assumption I consider impossible, if only for historical reasons (shellac arrived in Europe many centuries later), although a clear refutation based on hard data is still pending.⁹¹

The study of styluses is central to the reconstruction of writing techniques. A great number of examples survive, most made of metal and some of bone. Both the material and the shape of the writing tip play a crucial role, alongside the physico-chemical properties of the wax layer, in determining the execution and appearance of the incised strokes – one of the aspects most in need of further research.⁹²

Finally, wax tablets also can be studied in their relationships and interactions with other types of media, both rewritable and non-rewritable. Given that wax tablets, coated wooden tablets, papyrus scraps, and ostraca were all, in principle, available, which type of manuscript was preferred, and based on what factors? In

project 'Tabulae Ceratae: An Object-Based Approach to Roman Stylus Tablets'. See her contribution to this volume, n. 8.

⁹⁰ Consider, e.g., the term *maltha*, on which see Büll 1969; Büll 1977, 798–817.

⁹¹ See the provisional report by Fuchs, Ferreira and Cammarosano 2023. For the critical edition of the corpus, see Camodeca 1999.

⁹² A particularly illuminating and, in fact, unique study on this issue is provided by Gerlach 1965. Central to the reconstruction of the writing technique(s) used on wax tablets is the question of whether legibility was ensured by lighting contrast only (the strokes remaining within the wax layer without exposing the underlying wood), or, in some periods and contexts, 'by intentionally exposing the white surface of the wood below with the point of the stylus' (Collingwood and Wright 1992, 11, endorsed by Speidel 1996, 17; Tomlin 2016, 15–16). I plan to argue for the former hypothesis in a forthcoming paper.

a given context, what influenced the choice between writing down a preliminary, ephemeral draft versus a definitive and lasting version, and on which medium? These questions must be examined by distinguishing and specifying the roles of the various factors involved, ideally based on an interdisciplinary, careful analysis of available textual, iconographic, and material evidence.⁹³

4.2.4 Wax tablets in the Middle Ages and Early Modern Period

The simultaneous use of various types of rewritable manuscripts observed for the classical world continued in Late Antiquity and medieval and early modern Europe, and wax tablets continued to play a fundamental role among them. Being produced in a bewildering variety of sizes, typologies, and specifics,⁹⁴ they continued to represent the medium of choice for the acquisition of writing, and therefore in school context, as a support for taking notes, especially in situations where the use of ink and inkwells was not ideal, such as working outdoors or while travelling, and in all contexts in which the written text required periodic corrections and updates, as with inventories and running accounts.⁹⁵ Some tablets have a composite writing surface, where one page (or part of a page) was made of (or provided with) a sheet of parchment or paper and the facing page (or another portion of the same page) was coated with wax. The former typically contained the ‘stable’ information, such as library book titles or the names of taxpayers, while the latter was meant to record corresponding temporary data to be updated regularly, such as loan and return dates or amounts paid and outstanding.⁹⁶ The impact of wax tablets as a writing medium extended to the field of science, as demonstrated by tablets’ combination with sundials.⁹⁷

Particularly notable is medieval authors’ extensive use of wax tablets for the first drafts of literary compositions, taking advantage of the possibility to easily make corrections and thus revise the text until reaching the definitive version, which was then transferred to supports intended for long-term storage of the text (mostly parchment). This is what prompted Richard Rouse and Mary Rouse to

⁹³ Extensive studies on this topic include Dorandi 2007 and Pecere 2010, with further references. For a concise but dense overview, see Del Corso 2016.

⁹⁴ Büll 1977, 787–791, 838–853; Wozniak 2021.

⁹⁵ Wattenbach 1896, 51–88; Gerlach 1965; Büll 1977, 785–894; Graßmann 1986; Rouse and Rouse 1989a; Rouse and Rouse 1989b; Lalou 1989; Lalou 1992a; Lalou (ed.) 1992b; Krüger 2003; Chartier 2007; Wozniak 2021.

⁹⁶ Büll 1977, 790–791.

⁹⁷ Schewe and Davis 2019.

state, ‘The wax tablet, as a support for the written word, had a longer uninterrupted association with literate Western civilisation than either parchment or paper, and a more intimate relationship with literary creation’.⁹⁸ Both textual and visual sources provide compelling evidence of this role as a ‘bridge’ between thought or spoken word and writing intended for permanence. Examples range from the sermons that Bernardino of Siena held in 1427, preserved thanks to the shorthand notes – ‘*de verbo ad verbum*’ (‘word for word’) – that a cloth-cutter named Benedetto di mastro Bartolomeo took on wax tablets while attending them, to famous depictions such as that of Pope Gregory the Great’s *famulus*, poised to take notes on a *codex ansatus* (i.e. a wax-coated tablet with a handle) in the so-called *Gregorblatt*.⁹⁹ Another emblematic miniature, dated c. 1380, portrays the Flemish mystic Jan van Ruusbroec in two successive moments: first, outdoors, inspired by the Holy Spirit as he takes notes on a wax tablet analogous to that of Gregory’s servant, and, later, indoors at his convent desk, transcribing his final text, based on his earlier notes, onto a parchment manuscript (Fig. 10).¹⁰⁰

In both depictions, the wax is not black – as is typical in representations from Antiquity, the Middle Ages and the Early Modern Periods – but green. Some surviving medieval and early modern specimens also exhibit green wax. The preference for this colour is attested in written sources as well, the most notable being the poem the cleric Baldric of Dol (Baudri de Bourgueil, c. 1050 – 1130) dedicated to his own wax tablets (‘*Ad tabulas*’).¹⁰¹ Baldric justifies his preference according to the aesthetic appeal and pleasantness of the green hue, as well as the significantly improved legibility of inscriptions on green wax compared to the more common black. This brings us back to the discussion in Sections 2.2 and 2.3 on the importance of the colour of the wax mixture. In the writing technique used for wax tablets, legibility depended uniquely on the interplay of light and shadow, making background colour, light intensity, and angle of illumination essential factors.¹⁰²

⁹⁸ Rouse and Rouse 1989a, 220.

⁹⁹ Trier, Stadtbibliothek, Hs. 171/1626, tenth century CE.

¹⁰⁰ Brussels, Koninklijke Bibliotheek van België, inv. no. 19.295–97, c. 1380 CE.

¹⁰¹ ‘As for the wax, it is old and black with grit, and this old wax disfigures your beauty. So you are less indulgent of the writer and resist his stylus as though you found it odious. Hence I am preparing green wax to replace the black, so as to make you more tolerant and friendly toward the scribe’, translated and discussed in Chartier 2007, 3.

¹⁰² Cultural factors also played a role. On the importance of green in the context of early modern reading and writing practices, see Knight 2014, 28–30.



Fig. 10: The Flemish mystic Jan van Ruusbroec writing notes on a green-paste wax tablet in the woods, and copying them onto parchment upon his return to the monastery; Brussels, Koninklijke Bibliotheek van België, inv. no. 19.295–97, c. 1380.

The history of the wax tablet's decline is closely linked to the introduction and spread of paper in Europe, starting in the eleventh century. But the dynamic by which paper took over from wax tablets cannot be defined in terms of a simple one-to-one substitution: it was rather a complex process in which several factors had a role, including the availability of materials, balance between costs and benefits, established customs, and legal frameworks.¹⁰³ The issue of whether making corrections to the text already written would be necessary or not is also of importance: in some areas of use, paper substitutes wax tablets especially when combined with graphite pencil, which became widely available only from the seventeenth century on. Wax tablets therefore experienced different fortunes in different contexts. For example, in the German

¹⁰³ See Thomas Wozniak's contribution to this volume.

area they remained in common use much longer than in Italy, broadly following the trajectory and spread of paper through the continent.¹⁰⁴

Instances where wax tablet use persisted exceptionally long are linked to specific environmental conditions. In particular, their use in the administration of saltworks in cities where salt production played a significant economic role, such as Lüneburg, Schwäbisch Hall, and Halle (Saale), is documented as late as the nineteenth century (Fig. 11).¹⁰⁵ In Rouen, wax tablets remained in use for liturgical purposes until the eighteenth century and, remarkably, were still employed by the fish market superintendent as late as 1849.¹⁰⁶



Fig. 11: A wax book from Halle (Saale), used for accounting purposes in a saltwork context, 17th c. CE, wood, wax mixture, and leather, 20 × 41 × 15 cm; photograph: Stadtarchiv Halle.

The specimens preserved for the Middle Ages and Early Modern Period are fewer than for Antiquity. Nevertheless, they are distributed over a wide chronological

¹⁰⁴ Stallybrass et al. 2004, 385.

¹⁰⁵ For Halle (Saale), see Büll 1977, 881–883; for Schwäbisch Hall, see Fehleisen 1919.

¹⁰⁶ Büll 1977, 786, 845, figs 619–620.

and geographical span and show an extreme typological variety. Élisabeth Lalou published a useful inventory in 1992, now susceptible to updating.¹⁰⁷ Similar considerations apply to the styluses, which have come down to us in large numbers, made of bone and metal, and in exceptional cases also of wood, and with a great typological variety.¹⁰⁸ The number and density of the preserved evidence, both tablets and styluses, are highly uneven depending on time period and geographical area.

A holistic study of wax tablets in the Middle Ages and Early Modern Period should adopt the same interdisciplinary approach already discussed in relation to Antiquity. Many of the key issues requiring further investigation are similar to those identified for Antiquity, particularly the composition of wax mixtures and the factors influencing them, the manufacturing practices of different tablet types, the writing techniques employed, and the relationship between wax tablets and other media, especially ink writing on parchment and paper. Regarding the first of these aspects, it would be particularly interesting to explore the interactions and cross-influences between the mixtures used for writing tablets and those for other applications of beeswax, such as seals, ceroplastics, and encaustic painting. This could be done by examining the numerous preserved recipes – which rarely specify the described mixtures' intended applications – combined with material analysis of surviving specimens. While recent years have seen growing interest in the material study of medieval and early modern wax sealings, contemporary wax tablets have not received the same attention.¹⁰⁹ As a result, the campaign of material analysis conducted by Reinhard Büll in the 1960s and 1970s remains virtually the only source of archaeometric data for this class of manuscript.

The impact of wax writing on palaeographic development and individual handwriting styles also has been scarcely addressed, despite its potential relevance (see the considerations already made concerning Antiquity and Roman cursives, Section 4.2.3). Finally, much remains to be explored regarding the relationship between wax tablets and other types of reusable writing media in specific historical contexts. Various other rewritable supports were used alongside wax tablets, sometimes within the same settings. These include uncoated wooden tablets inscribed with carbon ink; slate tablets, whose use was concentrated in particular contexts;¹¹⁰ and glass, though its application was limited.¹¹¹ Most notably,

107 Lalou 1992a.

108 Graßmann 1986; Merten 2009; Mårtensson 1962; Harjula et al. 2013–2015.

109 See, among others, Hahn 1995; Novotná and Dernovšková 2002; Bartl et al. (eds) 2015; Kasso et al. 2023.

110 Wozniak 2022.

important rewritable media were wooden tablets and parchment or paper sheets coated with a predominantly chalk-based layer, allowing inscriptions with carbon ink, chalk (and, in principle, also pastels and crayons), or metalpoint. It is precisely these ‘erasable coatings’ that are the focus of Section 5.

4.3 Material analysis of wax tablets

Several methods, both destructive and non-destructive, can be applied in studying wax mixtures in written artefacts:

- Optical microscopy and RTI help in observing the texture and details of artefacts, and can be employed for enhancing legibility in the process of text edition.
- 3D laser scanning microscopy can be used to precisely measure relevant features, such as shape and dimensions of written traces; optical and electronic scanning can be used for analysis of specific elements embedded in the wax mixture, such as hairs.¹¹²
- X-ray micro-radiography and micro-tomography can be used to inspect volumetry and morphological structures within the wax mixture,¹¹³ and thus for accessing marks that may be present beneath the wax layer in wax tablets.
- A multi-analytical approach can be used for to characterise beeswax and added components, such as pigments, resins, and fats. This includes Fourier transform infrared spectroscopy (μ -FTIR), micro-Raman spectroscopy (μ -Raman), and scanning electron microscopy with energy dispersive spectroscopy (SEM-EDX) as well as mass spectrometry techniques, ideally used in combination.¹¹⁴
- Palynological analysis can be used to reveal traces of pollen and microorganisms nestled within wax blends. While the concept of genomic analysis holds promise for sequencing the DNA of honeybees and other organisms, the conventional techniques applied in extracting and processing beeswax normally result in a scarcity of genomic material of adequate quality.¹¹⁵ Illumina high-throughput sequencing has proved useful for investigating microorganism

¹¹¹ Wozniak 2024.

¹¹² Charlier et al. 2016.

¹¹³ Karch et al. 2016.

¹¹⁴ See Hahn 1995; Regert, Langlois and Colinart 2005; Regert 2009; Serpico and White 2000; van den Berg et al. 2000; Ferreira et al. 2016; Tamburini et al. 2025.

¹¹⁵ Kasso et al. 2023.

and metabolite diversity in wax seals, and thus for better assessing biodeterioration processes.¹¹⁶

Ideally, the analysis should be able to distinguish the components originally present in the mixture from those that may have been added as a result of restoration and conservation processes (including resins and waxes, both natural and synthetic) and from possible breakdown products. In addition to the analytical methods listed above, compound specific radiocarbon analysis can be used for this purpose.

5 Erasable coatings

‘Erasable coatings’ encompass writing and drawing with materials such as carbon ink, chalks (including pastels and crayons), and metalpoint on surfaces coated for subsequent washing and rewriting. The coating, often chalk based, is the key element in the rewriting process, with the underlying surface, whether hard (wooden boards, pottery sherds) or soft (parchment, paper), playing a secondary role. While both coated and uncoated surfaces can be inscribed with the above-listed materials and then washed in order to be reinscribed, *ceteris paribus* the use of coated surfaces proves more effective.

The material aspects related to the use of erasable coatings for writing purposes are surprisingly under-researched. While metalpoint and related coatings have been a regular object of material analysis in art history and conservation studies in connection to drawing,¹¹⁷ hardly any material analysis in relation to writing tablets is available,¹¹⁸ and the same applies to replication and experimentation.¹¹⁹

116 Szulc et al. 2020.

117 See e.g. Duval et al. 2004; Burns 2012; Quintero Balbas et al. 2022.

118 But see Pietschmann 1898, 53–54 on ancient Egyptian boards: ‘Traces of surface preparation can almost always be found on the wood, at least remnants of a light whitewash applied before writing. Not infrequently, the surface also consists of a gypsum or chalk base covered with a thin layer of linen, which is then coated again with a white pigment. This prepared surface, once smoothly polished, was often given an additional water-insoluble varnish to prevent the ink from spreading and to allow for easy washing. Over time, this varnish, similar to the one used on white-painted wooden or papier-mâché mummy cases produced in a similar manner, has often developed a yellowish tint’ (my translation). See also the subsection by William Brashear in Brashear and Hoogendijk 1990, 24–25.

119 A partial exception is Stallybrass et al. 2004. Methods that can be employed for analysing these kinds of manuscripts include X-ray fluorescence (XRF) reflection, FTIR and Raman spectroscopy.

5.1 Erasable coatings in ancient Egypt, the classical world, and the Qur'anic tradition

The practice of coating boards or sheets to enhance rewritability has ancient origins, notably in Old Kingdom Egypt, where coated tablets started to be extensively used in scribal schooling and note-taking (see, in Elena Hertel's contribution to this volume, Fig. 8).¹²⁰ As mentioned in Section 4.2, wax tablets were not used in Egypt before the Hellenistic Period, and it is no coincidence that the primary contexts of coated board use in Egypt are the same as for wax tablets in the Greco-Roman world, first and foremost the acquisition of writing in the school context, but also note-taking and as an aide-mémoire in performing rites.¹²¹ Importantly, while up to around 1000 BCE tablets were regularly coated, from the Third Intermediate Period (starting 1070 BCE) onwards, their format became smaller and writing was normally applied directly to the wood.¹²² The reasons for this change in practice are not known, but as a matter of fact in all subsequent periods we find both coated and uncoated writing tablets, often within the same contexts, as is still the case in the tradition of the Qur'anic school, which ultimately derives from the Egyptian use of this medium.

Coated wooden writing tablets are well documented in Greek and Roman contexts, with surviving examples primarily from Egypt¹²³ and evidence from literary sources for all areas.¹²⁴ Some of the terms used to refer to coated tablets explicitly point to a white-coloured coating (λευκώματα [*leukómata*], *tabulae dealbatae*, *alba*). One of the main contexts of use appears to have been the publication of notices, bills, and other texts of an intrinsically ephemeral nature, which were painted on large-format coated boards that were then washed and reused as appropriate.¹²⁵ Smaller-format tablets were also used and coexisted with other eminently rewritable media, first and foremost wax tablets and uncoated wooden tablets, but also, to some extent and with limitations, ostraca as well as papyrus

copy, ultraviolet and near infrared NIR reflectography, visible spectrophotometry, computer tomography, and laser scanning micro-profilometry. Additionally, vibrational spectroscopies are sensitive to both the chemistry and structure of the compounds of the coatings and of the writing substances (kindly pointed out by Claudia Colini and Stelios Aspiotis).

¹²⁰ Pietschmann 1898; Vernus 1984; Brashear and Hoogendijk 1990, 21–33; Cenival 1992; Hagen 2013; Motte 2022.

¹²¹ For the last context of use, see Quack 2001, 305 with n.77.

¹²² Berkes et al. 2015, 384.

¹²³ Brashear and Hoogendijk 1990.

¹²⁴ Degni 1998.

¹²⁵ Marichal 1992; Fioretti 2012, esp. 410–415. On the technique of writing with the brush, see also Donati 1998.

and parchment sheets. In Coptic Egypt, the simultaneous use of wooden tablets (both coated and uncoated) and wax tablets within the same monasteries and schools reflects the mingling of Egyptian and Greek traditions, and thanks to the favourable climate is witnessed in numerous extant manuscripts (Fig. 9).¹²⁶

As mentioned above, wooden tablets as a tool for learning to write were adopted from Egyptian practice into the Islamic world, where it became inextricably linked with the Qur'anic school. The specific writing techniques used in Qur'anic schools across different countries and locations throughout the history of Arab-Islamic traditions vary, as do the types of wood employed. While some traditions have pupils write directly in ink on wood (as in the Qur'anic schools of northern Nigeria discussed in Andrea Brigaglia and Dahir Lawan Mu'az's contribution to this volume), others use tablets with a coating, which itself appears in numerous variations. In addition to plaster, similar to what is attested in ancient Egypt, Antiquity, and medieval Europe, late-nineteenth-century Mozambique provides evidence of a coating made from a dried and powdered marine plant.¹²⁷ A fascinating chapter in Geert Mommersteeg's *In the City of the Marabouts* describes the practice in Djenné, Mali, of coating tablets with a layer of mud, which, once dried, serves as the writing surface in the initial stages of Qur'anic education (Fig. 12). First, the teacher writes in ink the passages the pupil must memorise. Then, using a sharp wooden stylus, the teacher incises the text, creating grooves for the student to trace over in ink.¹²⁸ Finally, the student fill in the traces with ink directly on the dried-mud layer. Throughout these stages, each time a lesson is successfully completed, the tablet is washed, allowing the mixture of mud, ink, and water to drain into a special jar, the contents of which are later disposed of according to Qur'anic guidelines. The tablet is then ready to be coated with a fresh layer of mud and reused. Finally, a thirteenth-century technical treatise compiled by Abū Bakr Muḥammad b. Muḥammad al-Qalālūsī describes how to prepare clay crayons for teaching, arguably used on erasable Qur'anic tablets (but quite possibly on other surfaces as well).¹²⁹

¹²⁶ Pintaudi and Sijpesteijn (eds) 1989.

¹²⁷ According to an account published in 1901 and quoted in Bonate 2016, 98: 'For writing, instead of paper they use a flattened rectangular wooden board, more or less half a meter of length, which is called *nimbao*; it is whitewashed with a type of lime made of some marine plant, which is sun-dried and reduced into powder in stoop; the ink is made of cinders dissolved in water. When *nimbao* is full of characters [i.e. writing], they wash it, and whitewash again. The pen (*m'tati*) is made of the stalk of a narrow corn [millet]'.

¹²⁸ Such a method is attested in other traditions as well: Quintilian, for instance, describes a similar technique for teaching writing, though in his case, the grooves were incised directly into the wood; see Fioretti 2010, 7–8.

¹²⁹ See Sara Fani's contribution to this volume, Section 2.



Fig. 12: Lessons at a Qur'anic school in Djenné, Mali, using mud-coated writing tablets. An advanced student scratches the Qur'anic text into the layer of mud, and a pupil will subsequently fill in the traces with ink. After a passage has been thoroughly learned, the tablets are ritually washed, and a new layer of mud can be applied (pupil on the left). From Mommersteeg 2012, 41–42.

5.2 Erasable coatings in the Middle Ages and Early Modern Period

Turning back to the Western tradition, the evidence for coated tablet use in Late Antiquity and the Early Middle Ages is very scarce, while it becomes abundant from the High Middle Ages onwards, encompassing textual and iconographic sources as well as several extant examples.¹³⁰ Importantly, coatings were now applied also to sheets (of parchment and paper) in addition to wooden tablets, and, alongside ink, paint, and chalk, they were also inscribed in metalpoint. The practice is famously described by Cennino Cennini in his *Il libro dell'arte*, where it is explained how to prepare a paste made of bone ash and saliva for spreading over a wooden tablet – preferably boxwood or figwood – on which one could draw using a silverpoint stylus.¹³¹ Cennini further explains that with a stylus made of lead or a lead-tin alloy, one could also draw directly on wood, as well as on paper and parchment, and that the marks could be easily erased using a bit of fresh bread.¹³² While Cennini addresses aspiring artists, we know from numerous written sources, including technical literature, that this technique was also widely used for writing and calculating.¹³³

As far as the coating is concerned, many variants are attested, and the same applies to the metals and alloys used for drawing or writing. ‘Recipes’ for coating and metalpoint writing can be found in several manuscripts from the Middle Ages and Early Modern Period besides *Il libro dell'arte*. The relevant sources include miscellaneous texts, Edward Norgate’s and Theodore de Mayerne’s notorious art-technical treatises, and calligraphy handbooks of the seventeenth and eighteenth centuries.¹³⁴

130 Wattenbach 1896, 91–96; Rosenfeld 2002, 55–60.

131 Cennini, *Il libro dell'arte*, §§ 5–8, 10–12, ed. Ricotta 2019, 156–159.

132 Using bread as an eraser was widespread up to the twentieth century. Importantly, silverpoint is by no means easily erasable, differently than lead or lead-tin, which is why Leonardo recommended young artists sketch models in silverpoint in a notebook with gesso-coated pages (e.g. Chapman and Faietti (eds) 2010, 40; Leonardo da Vinci, *Trattato della pittura*, § 175, ed. Milanesi 1890, 73).

133 The fundamental literature on metalpoint includes Meder 1923, 72–100; Watrous 1957, 3–33; van de Wetering 1991; van de Wetering 1997, 46–73; Woudhuysen 2004; Stallybrass et al. 2004; Burns 2012.

134 See, for example, a recipe for producing parchment noteboards (‘de tabulis ex pergamento’) in the *Liber illuministarum* from Tegernsee (c. 1500), Munich, Bayerische Staatsbibliothek, Cgm 821, Bartl et al. (eds) 2005, with commentary to the recipe by Doris Oltrogge on pages 653–656; a recipe ‘to make white tables to write in with the pointe of a wire, such as come out of Germanie’ in the *Secrets of Alessio Piemontese* (1555, cited in Stallybrass 2006, 559, n. 22); recipes nos 55 and 57–59

Tablets and sheets with an erasable coating for writing in ink and metalpoint were often combined into pocket-sized notebooks. They were typically labelled with terms derived from Latin *tabula* – such as *tavolette*, *Schreib-Tafeln*, *Tafelnoten*, *tables*, *tablets*, and *table-books*. They offered the advantage of easy erasability – particularly when using lead styluses – alongside an ink-free writing technique, making them highly portable and convenient, especially for outdoor use and even while riding. This explains their growing popularity, especially among merchants, professionals, and travellers, as well as anyone in need of a practical way to take notes without the inconvenience and mess of ink and inkwells. During the sixteenth century, erasable notebooks were mass-produced and circulated widely, especially in Northern Europe, with the Netherlands being one of the main production centres. They often included not only erasable pages but also calendars, almanacs, lists of fairs with their respective dates, exchange rate tables, and reproductions of coins – features particularly useful for merchants and travellers. In many cases, the metal stylus could be conveniently stored and secured within the notebook itself using dedicated loops and compartments, as evidenced by the few surviving examples and numerous iconographic sources. In a well-known article, Peter Stallybrass, Roger Chartier, J. Franklin Mowery, and Heather Wolfe ‘rediscovered’ what had been perfectly obvious to William Shakespeare’s original audiences until the nineteenth century – namely, that Hamlet’s reference to the ‘table of my memory’ (Act I, sc. v, l. 105) directly alludes to these erasable notebooks.¹³⁵ The earliest known example of this kind of notebook, identified by Peter Stallybrass, was made in Antwerp in 1527,¹³⁶ and the famous *Portrait of a Man*, possibly *Jan Snoeck* (c. 1530) by the Antwerp artist Jan Gossaert features an almost identical notebook, possibly bound by the same binder (Fig. 13).

in the De Mayerne manuscript (London, British Library, Sloane 2052), ed. Berger 1901, 152–154; and a recipe by Robert Hooke (British Library, Sloane 1039, fol. 117^r, cited in Yeo 2014, 20). Neither have such sources ever been collected and discussed systematically (see the ‘appeal to interested young researchers’ in van de Wetering 2016, 305), nor has this topic ever been addressed from the perspective of palaeography and manuscript studies. In his groundbreaking book *Rembrandt: The Painter at Work*, Ernst van de Wetering (1997) highlights the importance of metalpoint notebooks to art history, which has received growing attention in recent years. Their relevance for manuscript studies, by contrast, has never been thoroughly investigated.

¹³⁵ Stallybrass et al. 2004; but also see the much earlier Hone 1827, 1.

¹³⁶ According to the title page of the enclosed almanac, ‘Item you may write here with a stylus of gold, silver, tin, copper, or brass, and you may erase [what you have written] with a wet finger. And when you have worn out [the erasable surface], so that you cannot write on it any more, you can get it repaired by Jan Severszoon, parchment maker, for a little money, and you can then write on it as if it was new. [...] Item if you get grease on it by erasing with your finger, you should use a clay sponge [*cleyspongie*] with a little flour, and the grease will come off’ (after Stallybrass 2006, 558).

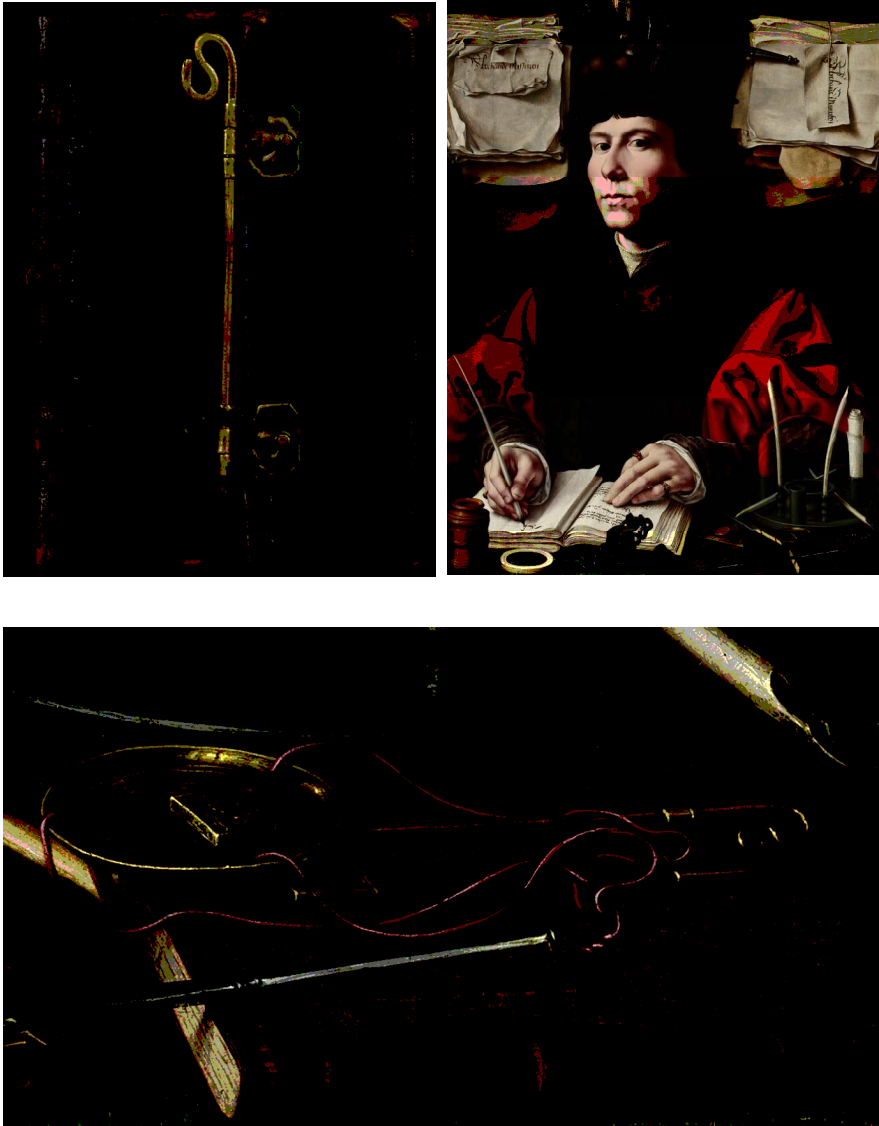


Fig. 13: Erasable notebook, Antwerp, 1527, The New York Public Library, Spencer Collection, Neth. 1527 94-143. Jan Gossaert, *Portrait of a Man, possibly Jan Snoeck*, c. 1530, Washington DC, The National Gallery of Art, accession no. 1967.4.1.

In the late eighteenth and nineteenth centuries, this kind of surface was often called ‘asse’s skin’ and was made of paper or parchment coated with gesso mixed

with glue.¹³⁷ Sometimes, an additional layer of varnish was applied, making erasure with a damp sponge or cloth even easier and more effective – not only for metalpoint writing but also when writing with ink. In view of Richard Pietschmann's observations about ancient Egyptian coated wooden boards (see Section 5.1), comments by De Mayerne on 'recipes' nos 58 and 59 are particularly interesting. Commenting on an Italian recipe 'A fartacco la bianca per scriuer con stil d'ottone, come i libbrettj da conto che vengono d'Allamagna',¹³⁸ which describes the process for producing a coating made of gypsum, animal glue, and white lead, he notes:

After adding oil, the material does not allow writing with the brass stylus, but it can be written on with ink. The ink should also be made from lamp black and gum, without vitriol, as it [i.e. iron-gall ink] adheres too strongly and is difficult to remove.¹³⁹

Similarly, remarking upon an analogous recipe immediately after that, De Mayerne notes:

On parchment, paper glued to a board, or canvas stretched on a frame, apply lead white and ochre ground with drying oil or half-thickened linseed oil using a large, soft brush. Do not let it dry completely. Then sprinkle burnt bones and finely ground eggshells over it, as is done with smalt. Let it dry thoroughly. You can then write on it with a copper, silver, or lead stylus and remove the writing by washing. However, for writing with a pen, apply a layer of varnish.¹⁴⁰

This technology must now be painstakingly reconstructed through mostly indirect sources, since the once common manuscripts associated with it have largely disappeared due precisely to the ephemeral nature of the texts and drawings they contained. It holds significance not only for the history of writing and disciplines such as codicology and palaeography but also for various aspects of cultural and cognitive history. In his book *Notebooks, English Virtuosi, and Early Modern Science*, Richard Yeo shows how various kinds of erasable notebooks played an important role in the complex process of note-taking and knowledge management

137 Burns 2012, 144–147 with literature; Stallybrass 2006, 558–561; Yeo 2014, 20. For the results of a replication test, see Stallybrass et al. 2004, 382 with figs 3–8 and 388 with n. 36.

138 'To make the white (coating) more adhesive for writing with the brass stylus, like in the notebooks for counting that come from Germany' (my translation). See Berger 1901, 154–155.

139 Berger 1901, 154–155, my translation. The alleged difference in the erasability of carbon versus iron-gall ink is particularly intriguing, given experimental observations made by others (see Colini and colleagues' contribution to this volume), and prompts additional, systematic investigation.

140 Berger 1901, 154–155, my translation.

that led to the emergence of modern science in the scholarly circles of early modern England, citing various recipes for erasable paper coatings collected by Robert Hooke, John Locke, and other leading members of the Royal Society.¹⁴¹ And in recent years, Ray Schrire has been investigating the crucial role of rewritable surfaces and their associated practices in the social history of early modern popular numeracy.¹⁴²

Coated tablets and sheets of various formats coexisted with other types of rewritable manuscripts: the ‘poorest’ and most elementary type, the uncoated wooden tablet inscribed with ink; slates, whose use however is concentrated in specific contexts,¹⁴³ and ivory¹⁴⁴ and glass,¹⁴⁵ of limited use. A context in which the coexistence and interplay of all these techniques is exemplarily attested is that of musical drafts in the Middle Ages and Early Modern Period, explored by Randall A. Rosenfeld, expanding on work by Jessie Ann Owens and others.¹⁴⁶ Besides memory, composers used wax tablets, ‘correctable’ slates, coated tablets and sheets, and lead on uncoated parchment or paper as rewritable supports for sketches and drafts of their music, variably referred to with terms like *cartelle*, *tabelle*, *tabulae compositoriae*, and more. Rosenfeld’s considerations in respect to music composition apply to the field of writing and note-taking as well, and may serve both as an apt conclusion for the present study and as encouragement for future ones:

The relative frequency of use of the different sorts of correctable support, with respect to one another, has been poorly calculated. [...] Basic research is still required on many aspects of these technologies, apart from any consideration of their use in the composition or transmission of music. [...] Perhaps the most important questions arising out of this research are how these technologies may have affected composers’ working methods, the teaching and *Überlieferungsgeschichte* of music, and even musical style. Eventual answers to those questions should not invoke a strict technological determinism except as a last resort, for without first taking into account the human element in these technologies (i.e. the level of

141 Yeo 2014, esp. 20–21, 104–105.

142 See Ray Schrire’s blog post ‘The Mystery of Humphrey Walcot’s Grocery Bill and Early-Modern Popular Numeracy’, Folger Shakespeare Library, 18 November 2021, <<https://www.folger.edu/blogs/collation/umphrey-walcots-grocery-bill/>>, and cf. the comparable and in many aspects analogous picture seen for Sanskrit mathematics recalled in Section 2.1 above.

143 Wozniak 2022.

144 Stallybrass 2006, 555–558.

145 Wozniak 2024.

146 Rosenfeld 2002.

skill that can be achieved by experts, and the degree of flexibility in the results they produce), the technologies cannot be said to have been fully understood.¹⁴⁷

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147 Rosenfeld 2002, 58, 60.

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Abbreviations

CIL = *Corpus Inscriptionum Latinarum*, Berlin: Reimer / De Gruyter, 1862–.

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Marilena Maniaci

The Future of the Past: Rewriting as a Cultural Practice from Handwritten Artefacts to the Digital Age

Rewritable media and practices embody a fundamental paradox: they preserve content while simultaneously enabling its destruction or transformation. This duality makes them powerful tools for adaptation, alteration, reinvention, and functional reuse. Across cultures and throughout history, the act of rewriting not only demonstrates the skill and resourcefulness involved in shaping and reinventing the function of writing materials – whether clay, wax, metal, stone, bone, parchment, or a wide array of other more or less common materials – but also raises deeper epistemological questions about the mutability of supports and texts, the mechanisms of cognition, and the evolving boundaries of tradition and authoritative frameworks. To rewrite is to navigate the tension between the urge to fix knowledge and the need to replace or revise it, reflecting how societies have continually redefined memory, intellectual labour, and the delicate balance between continuity and change.

The fifteen contributions gathered in this volume (including the editor's dense and insightful introductory essay) offer multiple original and wide-ranging explorations of the physical and historical dimensions of writing, erasure, rewriting, and textual recycling across cultures, spanning vast geographical areas and many centuries of intellectual activity. The trajectories that the authors trace highlight that these practices were never merely incidental or driven solely by practical or economic necessity; rather, they were – and in some cases still are – deeply embedded in the cultural, political, and intellectual frameworks of the societies and communities that engaged with them. The reuse of manuscript media appears as a widespread phenomenon, encompassing a broad range of material and cultural approaches and strategies. A global perspective on this practice – such as the one proposed in the present collection – allows the reader to trace how different contexts and historical periods engaged with the recycling, repurposing, and adaptation of texts, whether out of material constraints, institutional needs, or evolving conceptualisations of authority and textual transmission.

Throughout history, various cultures have developed rewritable writing media – either independently or in relation to one another – each designed to serve specific functions and supported by distinct techniques of erasure and reuse: the examples provided in this volume are extensive, though inevitably partial. The

rewritability of clay tablets, widely used in the ancient Near East for administrative, literary, and legal purposes, depended on the clay's condition: when moist, mistakes could be smoothed out; once dried, tablets became resistant to modification but could still be softened with water, though erasure was harder to conceal. Some tablets were left blank, probably for future use, or had additional inscriptions added later. Scribes revised hardened tablets by inscribing over them, crossing out sections, or reworking text; evidence suggests that supplementary clay layers were sometimes added for repeated reuse. In rarer cases, tablets were fired into terracotta, preserving the text but preventing further alterations.

Erasure and replacement might also have affected public inscriptions of a monumental nature (not addressed in this volume) or those found on sacred objects, especially those written on metal plates, as in the context of the political and religious shifts that occurred following the destruction of Babylon by Sennacherib in 689 BCE and the subsequent efforts by his successors, Esarhaddon and Ashurbanipal, to restore Babylonian religious traditions.

The Greco-Roman world relied heavily on wax tablets (*tabulae ceratae*), a medium suited for both ephemeral and durable writings. The beeswax layer (enriched with soot or charcoal, resins, oil, and possibly other pigments) could be levelled with the spatula-shaped back end of a stylus and reused multiple times, making these tablets ideal for temporary records such as school exercises, letters, legal drafts, and business transactions. Certain types of texts could be made official or safeguarded against unauthorised access by inscribing them on sealed diptychs or triptychs. In military and commercial settings, where writing materials were scarce, erasing and reinscribing was routine: some tablets reveal multiple layers of overwritten text, as well as traces of scratches on the wooden surface, whose interpretation remains controversial. In certain cases, the wax was removed entirely, and the wooden recesses were reused for ink inscriptions. Stylus cases or sheaths attached to wax tablet sets, known only from iconographic sources, may parallel features of ancient codex bindings: these overlooked details could hypothetically strengthen the continuity between tablet gatherings and the codex, though this engaging hypothesis remains open to question.

The durability and portability of tablets ensured their continued use well into the Medieval Period, with monasteries, courts, and city administrations relying on them for ephemeral records. Frequent references in written sources suggest a broader diffusion than surviving evidence indicates. Until the advent of paper, much cheaper than parchment, tablets made of various woods (but also of ivory, silver, bone, and slate) were widely used for sketches, drafts, and conceptual work – before being transferred to more durable materials – as well as for accounts and registers.

Beyond the Mediterranean and European spheres, wood, sand, and metal tablets were also used in Islamic traditions in northern Nigeria, where their legacy persists among contemporary practitioners, enabling ongoing ethnographic study. Tablets served (and still serve) both educational and ritual purposes – including esotericism, occult sciences, divination, and magical practices – reinforcing writing as both impermanent and transformative. Qur’anic inscriptions, once memorised, are washed away with water that is then consumed, merging literacy with devotion and embedding sacred knowledge into the body. In esoteric contexts, metal tablets bear inscriptions that can be selectively erased or altered based on ritual needs, underscoring the written word’s dual role in preservation and controlled disappearance.

In seventh- and eighth-century Japan, wooden tablets known as *mokkan* played a crucial role in transmitting bureaucratic knowledge and literacy training. *Mokkan* were inscribed with ink and erased by scraping the surface with a blade, allowing students and officials to repeatedly revise their writing. These tablets functioned as indispensable tools for state administration, particularly for lower-ranking officials who used them for temporary records before committing information to permanent archives. The cognitive dimension of rewriting on *mokkan* underscores a broader relationship between erasable media and structured learning systems, where repetition, modification, and revision were fundamental to mastering complex scripts.

In Egypt, papyrus was the dominant writing surface, widely used for bureaucratic records, literary texts, and religious manuscripts, enabling ink to be washed or scraped off, and thus allowing for easy reuse. Yet economic constraints alone do not fully explain this practice. Scribes strategically repurposed manuscripts, adding notes in empty spaces or erasing sections to incorporate new content. Rewritability was closely linked to the fluidity of administrative and religious traditions, whereby documents were continuously updated, reinterpreted, and reshaped within evolving textual hierarchies. As for parchment (whose reuse is treated only tangentially in this collection and requires its own dedicated attention), its suitability for rewriting is evidenced by the large number of surviving parchment palimpsests, as well as by treatises and recipes detailing methods for ink erasure and renewal of this writing surface.

The reading of the volume reveals multiple lines of inquiry that intertwine the materiality of writing supports and tools, the mechanics of writing, the practices of erasure and rewriting, and their literary, cultural, administrative, functional,

economic, and religious implications. Across the considered cultures – and beyond them – the tension between permanence and transience shaped how societies recorded, elaborated, transmitted, and preserved knowledge, demonstrating that rewriting was not merely a practical necessity but at once an act imbued with cultural, political, and symbolic significance.

At the core of the authors' reflections lies the relationship between durability and change, stability and transformation. Several contributions highlight how the physical properties of writing supports – whether clay, wax, wood, metal, papyrus, parchment, or another material – shaped both practices of textual modification and strategies of preservation. Cuneiform tablets from ancient Mesopotamia exemplify this dual nature: simultaneously stable and modifiable, they challenge the notion that ancient texts were meant to be immutable. Palimpsests, widely used in Late Antiquity and the Middle Ages, offer another compelling example. Costly and durable, parchment was often scraped and reused, particularly in monastic contexts, where demand for writing materials frequently outstripped supply. However, the reuse of parchment codices was not solely dictated by scarcity: some texts were erased due to theological, political, or intellectual shifts, underscoring the interplay between material constraints and ideological motives. The layered nature of palimpsests provides modern scholars with a unique window into historical processes of both material recycling and textual revision. The study of Coptic manuscripts, for instance, reveals how different textual strata – whether preserving the same content, combining literary and documentary texts, or integrating fragments from different books – shed light on the intricate history of textual transmission and reuse.

The pragmatics of rewriting emerges with particular clarity in administrative and commercial contexts. The repeated reuse of papyrus, wax, and parchment in bureaucratic settings was driven not only by economic constraints but also by institutional imperatives and practical considerations. Studies on Roman and medieval wax tablets reveal that many documents were intentionally designed to be temporary and rewritable, providing a cost-effective yet functionally necessary alternative to more durable materials. The same applies to Egyptian administrative papyri, which were frequently erased and repurposed to meet evolving needs. These practices highlight both the adaptability of writing supports and the strategic role of textual reconfiguration in bureaucratic efficiency and administrative continuity – underscoring that economic necessity was only one factor among the many involved.

Beyond official inscriptions and administrative texts, scribes also employed erasure techniques in contexts where the ability to update, obscure, or even censor records was essential to institutional governance, as in the striking case re-

counted by Herodotus, in which a writing tablet was manipulated to conceal a critical message. This example demonstrates how erasable media could serve not only as everyday writing tools but also as instruments of subterfuge and ‘intelligence strategy’.

Erasure techniques were often not simply practical interventions: they embodied deeper cultural conceptions of memory, authority, and the life cycle of the written word. In the Islamic tradition, the deleting and rewriting of sacred texts carried deep spiritual connotations. In Islamic education for instance, transient writing surfaces such as wooden Qur’anic tablets played a crucial role: students would inscribe their lessons, recite them, and then wash the tablets clean for reuse. Erasure and rewriting was part of the memorisation process, establishing a direct link between textual impermanence and sacred learning. Beyond pedagogy, erasable writing surfaces extended into esoteric traditions, as in northern Nigeria, where sand tablets continue to be used for divination and mystical inscriptions, emphasising the impermanence of the written word and the ephemerality of knowledge itself. In certain esoteric traditions, ink washed from sacred inscriptions was dissolved in water and consumed, transforming writing into an almost magical substance capable of transferring divine knowledge to the body. Similarly, in medieval Christian monasticism, partial or total erasure and rewriting were intimately tied to liturgical adaptation and theological evolution, as codices might be rewritten or repurposed to align with new doctrinal and ritual requirements.

The volume also explores erasure and rewriting techniques as analysed through the study of textual sources alongside archaeological reconstruction and laboratory analysis. A significant example can be found in the Arab world, where these techniques – applied across various writing materials – reached a high level of sophistication, as evidenced by medieval treatises and collections of recipes on ink-erasing procedures, including sources from Iraq, Tunisia, Yemen, and al-Andalus. These texts can be examined through both philological analysis and material reconstruction, allowing, albeit with some uncertainties, for the replication of substances and procedures and the assessment of their effectiveness. Ink removal varied according to the writing medium – papyrus, parchment, and paper each required distinct methods, which also depended on the composition of the ink. Techniques included chemical washes (using plant extracts or acidic or alkaline substances), mechanical scraping or rubbing, and ink-masking methods employing white lead or plaster-like coatings.

Classifying the wide array of phenomena associated with erasure and rewriting is an inherently complex and often fraught endeavour. The sheer heterogeneity of materials – ranging from organic to inorganic, ephemeral to durable – complicates any attempt to impose clear taxonomies. Each writing support brings with

it not only specific physical properties but also culturally, traditionally, and functionally embedded modes of use, along with associated practices of modification and distinct symbolic values. Moreover, some supports may be repurposed in ways that blur conventional distinctions between object categories: a wax tablet might function simultaneously as a pedagogical tool, a legal document, and a memory aid; a parchment folio could transition from sacred scripture to part of a palimpsested liturgical codex, or even to binding waste. Beyond materials, the modes of writing and rewriting further resist standard classification; the purposes and functions of rewriting vary dramatically – from ephemeral use and practical correction to economic reuse, ideological revision, censorship, mnemonic training, and esoteric transmission. These functions often overlap or shift over time, making it difficult to assign a single interpretive framework to a given object or practice. This fluidity challenges scholars to rethink classification not as a rigid system of typologies but as a dynamic and context-sensitive process. Attempts to categorise must remain attuned to the stratified nature of writing objects, the layered intentions behind their reuse, and the evolving semantic fields in which they operated. Fixed taxonomies risk obscuring the very phenomena they seek to elucidate, flattening the intricate interplay between materiality, agency, and textuality. Instead, what is needed is a methodological pluralism that acknowledges ambiguity, embraces hybridity, and foregrounds the situatedness of each act of rewriting. Only by doing so can we begin to map the complex epistemologies that underlie the cultural practice of textual transformation.

Finally, the volume also offers valuable theoretical and linguistic insights into textual erasure. The study of the literary and documentary lexicon of rewriting from Antiquity to the Middle Ages reveals how different cultures developed specific vocabularies to describe textual modification – terms that not only reflect the material processes involved but also carry metaphorical significance and ideological implications. These linguistic choices – whose documentation should be further deepened and expanded to reflect and parallel the diverse manuscript cultures – illustrate broader attitudes towards textual authority and alteration. The recurring metaphors of smoothing, scraping, and removal in Latin and medieval texts suggest that writing, erasure, and rewriting formed a dynamic process extending beyond mere deletion to encompass cognitive, interpretative, and mnemonic dimensions.

The volume traces the evolution of rewritable media and practices across diverse historical and cultural contexts, highlighting both striking similarities and signifi-

cant differences in how societies have approached erasure, modification, and textual recycling. The wide range of methodological approaches that the authors adopt reflects the complexity of the subject, integrating archaeological evidence, codicological and palaeographical expertise, technical literature, laboratory-based analytical techniques and experimental replication, iconographic sources, literary and linguistic analysis, and conservation and restoration practices. This interdisciplinary perspective is crucial for reconstructing the material aspects of writing supports, understanding techniques of erasure and reuse, and shedding light on practices that may remain elusive if approached from a single disciplinary perspective. Thanks to interdisciplinarity, the study of erasure and rewriting has gained depth and robustness, and is poised to evolve even further – bridging historical inquiry, material science, and cutting-edge technology.

The need for systematically collected manuscript corpora that provide structured information on erasure and rewriting practices represents one of the main challenges in this field. While isolated case studies offer valuable insights, they often lead to overgeneralisations if not contextualised within a broader dataset. Resources like the ‘*Tabulae Ceratae*’ (TabCer) project or the *Tracking Papyrus and Parchment Paths* (PATHs) database of Coptic literary manuscripts and other structured collections provide an essential foundation for tracing patterns of manuscript reuse and reinscription across different cultures and periods. Nevertheless, the very nature of erasure and rewriting implies that much of this evidence has either vanished or remains difficult to quantify. Working with systematically gathered corpora allows scholars to move beyond anecdotal examples, making it possible to identify trends, assess the frequency and contexts of reuse, and ensure that single cases are not examined in isolation but understood as part of a larger network of textual and material transformations over time.

Just as codicology has developed methods for analysing the layered transformations of manuscript codices from a ‘syntactic’ perspective, other categories of rewritable writing supports could – and should – also be approached as stratified objects. Each act of modification – whether partial erasure, over-inscription, or complete reconfiguration – adds a new layer to the history of a written object. This ‘syntactic’ approach is essential for tracing successive interventions on a given writing support. Instead of treating reused materials as static carriers of information, this perspective allows scholars to reconstruct their ‘biographies’ as evolving artefacts that bear witness to the dynamic relationship between permanence and alteration, preservation and adaptation.

To fully account for these layers of transformation, targeted descriptive protocols need to be developed for documenting the phenomenon of erasure and rewriting in its various manifestations, enabling comparisons across different

traditions and writing supports and facilitating cross-cultural studies of textual modification. Such protocols should account not only for visible traces of erasure and rewriting but also for indirect evidence, such as structural modifications, chemical alterations, and even contextual clues from literary or archival sources.

Laboratory techniques are having a growing impact on the study of erasure and rewriting in manuscripts by providing objective, non-invasive, and increasingly precise methods for detecting and analysing textual modifications. Material analyses enable researchers to uncover erased or overwritten layers that are invisible to the naked eye, offering insights into scribal practices and material composition, but also the decision-making processes behind textual alterations. Beyond facilitating the recovery of lost texts, scientific analyses help clarify the physical and chemical interactions between inks, pigments, and writing supports, contributing to both historical research and conservation efforts. The integration of laboratory-based approaches with digital imaging, AI-driven pattern recognition, and multispectral analysis is fostering more systematic and large-scale studies, moving beyond isolated or anecdotal findings. Looking ahead, the combination of high-resolution imaging, chemical mapping, and machine-learning algorithms holds great potential for the dynamic reconstruction of palimpsests and rewritten texts, allowing scholars to visualise and interpret manuscript transformations across time.

The themes explored in the volume remain strikingly relevant in the contemporary age, when erasure and rewriting have taken on new forms and complexities due to the rise of digital writing practices and tools. Unlike physical media, digital texts can be altered invisibly, creating the illusion of permanent erasure when, in reality, deleted content often persists. Social media posts, emails, and records remain accessible in backup servers, cached versions, or hidden traces – akin to medieval palimpsests. Even intentional deletions leave recoverable fragments, raising ethical and legal concerns about transparency, privacy, and the right to be forgotten. The advent of artificial intelligence further complicates matters, blurring the boundaries between human authorship and automated modification, and challenging the integrity of textual transmission. The political stakes of erasure also remain high, from state-controlled internet censorship to debates over ‘cancel culture’, echoing historical practices like *damnatio memoriae*. Yet, while material scarcity once drove textual reuse, the digital era faces the opposite challenge: data overproduction. The limitless replication and storage of information contrasts

sharply with past cultures that valued reusability, prompting urgent discussions on digital waste and sustainability.

Through a wealth and variety of concrete examples – combining both new evidence and a fresh juxtaposition of known sources – this volume reminds us that erasure, rewriting, and textual recycling are not merely technical practices but cultural and intellectual acts that shape how societies construct, modify, and preserve knowledge. Although the papers primarily focus on erasure and rewriting, it is important to recognise that text obliteration and manuscript reuse extend across a remarkably broad spectrum, sometimes leading to extreme cases of repurposing that go beyond textual modification. One notable example is the reuse of papyri for non-textual purposes in ancient Egypt, whereby discarded or surplus documents were cut into strips and incorporated into cartonnage for mummification, reinforcing burial masks and coffins, thus transforming writing supports into ritual and funerary objects. Similarly, in the Medieval and Early Modern Periods, manuscripts were recycled as binding elements – book covers, endpapers, and structural reinforcements – a practice that unintentionally preserved fragments of older texts, leading to the rediscovery of works that otherwise might have been lost. Writing materials were not only rewritten but also physically reconfigured for entirely new purposes, sometimes obliterating their original function while paradoxically ensuring their survival in unexpected ways.

Situating the processes of erasure, rewriting, and repurposing within different historical frameworks allows us to gain new critical perspectives on the evolving relationship between writing technologies, textual transmission, and human memory. As we have entered an era of ‘digital palimpsests’ and AI-driven text production, understanding the material past of textual transformation remains essential for navigating its future.

Clay and Wax

Carmen Gütschow

A Restorer's Look at Rewritable Media: Cuneiform Clay Tablets in Conservation

Abstract: Made from silty clay, cuneiform tablets can be reused indefinitely by soaking them in water. Firing alters the clay's properties, introducing, for example, water resistance and strength, converting it into a new material – pottery – that is no longer rewritable. Historically, firing was the main method for preserving clay tablets, making them harder and allowing them to be desalinated. However, this process significantly transforms the original material. Therefore, modern conservation raises the question: is firing truly the best and only method of preserving tablets, or can we find alternative treatments that preserve their original state? Observations of various collections show that the same conservation problems persist, and so a re-evaluation of traditional methods is needed.

1 On the materiality of clay

In conservation, it is important to know the materials and their properties in order to understand the factors influencing the damage and destruction of an object. Cuneiform tablets are made from clay. Clay is a hydrated aluminium silicate with hexagonal flat crystals.¹ When wet, it is a plastic material; when dried in the air, it hardens. The dry, hard state can be returned to a plastic state at any time by adding water. This makes clay an infinitely recyclable material.

The typical clay of cuneiform tablets contains a naturally high concentration of 10–20 per cent,² or in some regions up to 35 per cent, calcium oxide, plus magnesium and carbonates.³ In the soil, most tablets also absorb additional sodium carbonates and sodium chloride. These different salts cause problems and damage the cuneiform tablets.

Tablet clay is not pure. It is called secondary clay,⁴ which means that the clay was transported by weathering and rain and made its way through rivers to its final deposit. Along the way, it picked up minerals, such as mica, plant material,

1 Hamer and Hamer 2004, 65.

2 Gütschow 2012, 42.

3 Schneider 1994, 101.

4 Hamer and Hamer 2004, 61, 318.

shells, sand, and grit. This gives the tablets their natural colour and characteristics. Analysis by David Thickett and Marianne Odlyha in 1999 identified tablet clay as a poor-quality silt, magnesium aluminosilicate.⁵ Further analytical projects, described by Michela Spataro, Jonathan Taylor, and Daniel O'Flynn, using various methods such as SEM-EDX, X-ray CT, pXRF, and magnetic susceptibility analysis, have been used to differentiate between the clays and their deposits.⁶ Subtle local differences, as well as differences between river and canal deposits and flood-plain clays, are also observed.⁷

The quality of the tablets depends on how the clay was used, or if and how it was processed. They can be rough and sandy, containing small stones or whole or crushed shells, or very fine and clean (Figs 1a–g).

The composition of the clay is slightly different from that of pottery. This is because, with a few exceptions, the clay was not intended to be fired. Only objects such as nails, cylinders, prisms, and special types of tablets were fired in the past. While the clay for objects such as prisms and nails was mixed with extra tempering material, including sand and chaff, the clay of fired tablets was usually very fine and pure. Salt may also have been added to the mixing water. Gerwulf Schneider describes how his ceramic samples burst when fired above 700°C due to carbonate decomposition, but after adding salt to the clay, this problem was solved. Another effect of the salt was a light-yellow colouring of the surface, but inside the shards were reddish⁸ (see a similar example in Fig. 9), a colour effect we can also observe on tablets fired in the past, as well as on prisms, cylinders, and nails. The quality of the clay influences the stability and subsequent decay of the tablets. The surface of the tablets can sometimes be described as harder and more dense, like an outer skin of the surface. This may be due to polishing of the surface, or it may be due to the drying process, when the finest clay particles move to the surface of the tablet with the evaporating water and accumulate there. These finest particles form a denser clay structure, which also becomes harder. The inscribed surface of clay cuneiform tablets, when these are fired, may flake off in layers of one to two millimetres thick or small pieces, while the core crumbles into finer particles or chips with less stability (Figs 2a–b).

5 Thickett and Odlyha 1999.

6 Spataro, Taylor and O'Flynn 2023.

7 Spataro, Taylor and O'Flynn 2023, 3.

8 Schneider and Daszkiewicz 2002, 12.



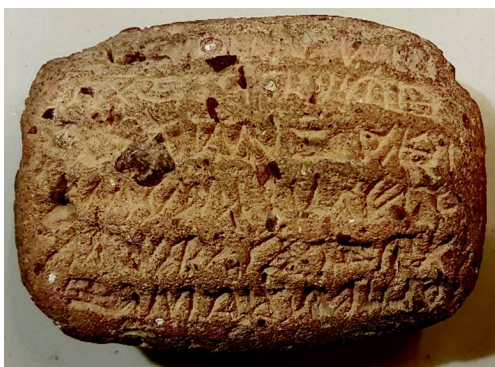
a: HS 2220



b: LB 781



c: LB 1947



d: LB 891



e: LB 60



f: LB 2112



g: LB 891

Figs 1a–g: Different appearances of cuneiform clay tablets (HS 2220; LB 60, 781, 797, 891, 1947, 2112). Photographs by Carmen Gütschow; © Friedrich-Schiller-Universität Jena / Universiteit Leiden.



a



b

Figs 2a–b: Working on highly fragmented cuneiform tablets: sorting and piecing together inscribed and uninscribed fragments at the LB.

Clay tablets that were no longer needed were discarded, broken,⁹ or crossed out (Fig. 3) and in some cases recycled.¹⁰ Sometimes wedges can be observed inside of broken tablets, especially the school tablets of beginners, where they reused the clay of their exercise tablets.¹¹



Fig. 3: Crossed-out tablet (HS 2294). Photograph by Carmen Gütschow; © Friedrich-Schiller-Universität Jena.

⁹ Taylor 2011, 19.

¹⁰ Taylor and Cartwright 2011, 300. Also see the extensive discussion in Jonathan Taylor's contribution to the present volume.

¹¹ The clay of school tablets was often of rather poor quality, see Gesche 2001, 41–57.

Looking inside broken tablets also gives us a lot of information about how they were made, such as whether they were kneaded, rolled, or folded. The creation method also influences the way they are damaged, such as breaking along connecting lines, or the folding and wrapping of layers (Figs 4a–d). In Figs 4c–d we can recognize an inner core and a separate layer around it. Clay particles are flat and tend to align according to how the clay mass is shaped; see, for example, the damaged corner of a tablet as shown in Fig. 5.

Furthermore, sometimes a difference can be observed between a coarse core and a fine surface layer.¹² Here it is possible that recycled clay or a lower-quality clay was used for the core, in order to save the fine clay for the writing surface. In some excavations, clay containers holding broken or complete tablets have been found. These are interpreted as recycling bins for clay tablets or clay objects in general.¹³

Unfired clay can be manipulated at any time by moistening it. To prevent unauthorized alterations, the surfaces of some tablets were sealed, or the tablets were wrapped to preserve the text inside. This ensured that the text could not be altered without damaging the seal or envelope. However, careful examination reveals that some tablets have been tampered with, as evidenced by words or lines erased using a stylus, hem, or cord. Entire text fields have sometimes been erased. On school tablets, it was common practice to repeat lectures on the same tablet. Occasionally, remnants of the old writing are still visible, or the erasure marks are very clear (see examples in Fig. 6). When restoring clay tablets, it is crucial to pay attention to these traces to make them visible.

¹² Taylor and Cartwright 2011, 300, 306; Taylor 2011, 12.

¹³ Taylor and Cartwright 2011, 301.



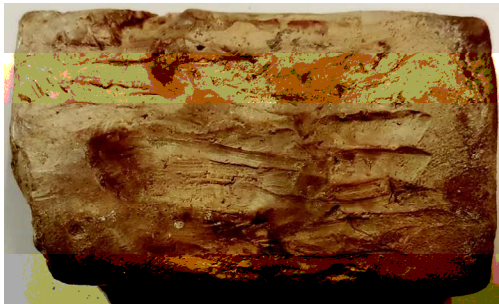
Figs 4a–d: (a–b) Tablets broken along folding: LB 1895, LB 391. (c–d) Tablets showing an inner core: LB 391, LB 547. Photographs by Carmen Gütschow; © Universiteit Leiden.



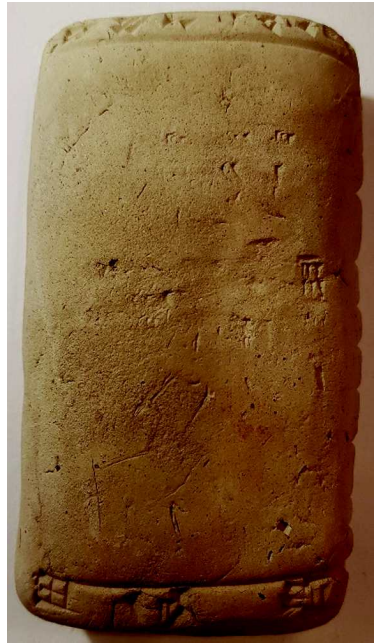
Fig. 5: Damaged tablet corner (LB 2054). Photograph by Carmen Gütschow; © Universiteit Leiden.



a: HS 0238+



b: LB 1827



c: LB 593



d: LB 583



e: LB 1067



f: LB 2045

Figs 6a–f: Erased lines and areas (HS 0238+; LB 583, 593, 1067, 2045). Photographs by Carmen Gütschow; © Friedrich-Schiller-Universität Jena / Universiteit Leiden.

2 A short history of the conservation of clay tablets

If we examine the history of tablet conservation, it becomes clear that preserving the rewritable nature of tablets was for a long time not a priority.¹⁴ In his excellent study on the manufacture, evaluation, and conservation of cuneiform tablets, Julian Edgeworth Reade reports a note by Charles Leonard Woolley about how tablets change after firing: ‘and the clay is turned to terracotta. Then the tablets are taken out; their colour may have altered, which matters little, but they are hard and strong’.¹⁵ During this time, the early twentieth century, the focus was mainly on hardening the clay. Unfired clay tablets were soft as ‘cheese’¹⁶ or broke into pieces when extracted and handled. Even tablets recovered intact were often cracked or broken, or they crumbled into dust after a short while.¹⁷

The first reports about the treatment of tablets come from nineteenth-century excavations in Iraq. Local robbers also attempted to harden the soft, unbaked tablets by putting them directly into fire, often causing the inscribed surfaces to flake off or crumble into dust, causing countless tablets to be lost forever.¹⁸ Some locals tried to harden the tablets by baking them in hot ashes, a method later adopted by excavators of the time. However, many tablets were still lost due to uncontrolled baking methods, such as firing them in ceramic pots filled with sand.

During the years 1850–1855, British excavators sent a large number of tablets to the British Museum in London. The tablets were just loosely packed in reed baskets, without any other packing material, and sent in transport boxes. They arrived covered in a thick layer of dust and earth, which could be removed easily with careful brushing. Many tablets showed hard crystalline deposits on their surface, which covered the inscriptions. No one at this time knew how to handle this kind of object. When they tried to remove the incrustations, the surface tore off or the tablets crumbled.¹⁹

The repairer for the trustees of the British Museum at that time was Mr John Doubleday. He attempted to harden the unbaked tablets by firing them in a kiln, but it was a disaster. Many of the clay tablets were destroyed during the process; they cracked, their inscribed surfaces chipped, or they crumbled. Another attempt involved immersing the tablets in a consolidating preservation solution, but this was

¹⁴ The following overview substantially draws on the comprehensive, in-depth study Reade 2017, to which readers are referred for a detailed account of the topic.

¹⁵ Woolley 1937, 93–94, quoted in Reade 2017, 187.

¹⁶ Pallis 1956, 312.

¹⁷ Budge 1925, 148.

¹⁸ Budge 1925, 134.

¹⁹ Budge 1925, 147–148, quoted in Reade 2017, 181.

also unsuccessful, and the tablets disintegrated into heaps. Consequently, Mr Samuel Birch, the head of conservation at the Department of Antiquities, halted Doubleday's experiments, and no further treatments were done on the tablets for the next three or four years. Then, another repairer was recommended to the museum: Robert Cooper Walpole Ready. He prevailed against a competitor and became Doubleday's successor in 1858 or 1859. Ready kept most of his treatment methods a secret, sharing them only with his sons, but he reportedly was very successful with his methods for both unbaked and baked tablets.²⁰ In 1887/1888, when Ready was very busy with other work, the department found a way to clean the tablets for themselves systematically.

Later, it became common to fire the tablets in oil-fired kilns directly at the excavation sites. Sometimes, the tablets were imbued with paraffin wax in order to harden them. The excavated tablets were dried in metal boxes with clean sand before firing. They were fired until the boxes were red-hot, around 900°C up to 1500–1600°C, and the clay turned into terracotta. After firing, they were cleaned with a brush.²¹

In the early twentieth century, Friedrich Rathgen from the Royal Museums of Berlin developed and published methods for the conservation of clay tablets. He described firing the tablets at temperatures up to 600°C, and sometimes performing a second firing at 950–1050°C.²²

Firing temperatures above 800–900°C cause further changes due to sintering, leading to shrinkage. Consequently, the size of the tablets fired this way may no longer correspond to their original size (Figs 9a and 9b). The high calcite content of the clay from Mesopotamia also influences its burning behaviour. Temperatures above 700°C can cause damage due to carbonate degradation. Above 850°C, the carbonate decomposes, and the sintering phase is accelerated. At temperatures around 950°–1000°C, the clay can change colour to yellow or olive (Fig. 11). Additionally, any salt added to the clay, whether naturally or through the mixing water, reduces the sintering phase. At temperatures above 1100°–1150°C, the clay will melt.²³

Later, in the 1960s, it became common practice to fire tablets at a maximum temperature of 700°C or 750°C. However, even at these temperatures, tablets sometimes burst during the firing process. Similarly, Schneider reported that his ceramic samples also cracked or burst above 700°C.²⁴

20 Budge 1925, 152–153. See Reade 2017, 182, for a hypothesis of how his method may have worked.

21 Delougaz (ed.) 1933, 40, 44.

22 Rathgen 1905, 84–85. On Rathgen's methods and impact, see Reade 2017, 185–187.

23 Schneider 1994, 103.

24 Schneider and Daszkiewicz 2002, 12.

Since the 1990s, mass treatment of tablets was discontinued in favour of single treatments as needed. Around 2000, a project at the British Museum aimed to analyse the composition of selected clay tablets and modify the firing process to reduce damage. They discovered that at a maximum temperature of 630°C, nearly no breakage occurred. This is due to the dominant phase of CaCO_3 , which starts at 645°C and produces gas pressure inside the tablet.²⁵ The process of ceramic change starts between 350°–450°C and has its critical point at 573°C, which concludes before reaching 700°C.²⁶ The new recommended firing temperature of 630°C made the tablets adequately resistant for water baths, and below 645°C no recarbonatization occurred when the tablets were bathed (Fig. 7). Recarbonatization was another problem that arose in connection with the old firing temperatures of 700°–750°C. At temperatures above 645°C, CO_2 escapes, and the remaining CaO reacts with water during the post-firing desalination bath to form Ca(OH)_2 , which appears as a white crystalline layer on the surface of the tablet (Fig. 7). The corresponding formula is $\text{CaCO}_3 + > 645^\circ\text{C} \rightarrow \uparrow \text{CO}_2 + \text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$. At 900°C, the calcite is burned out, so that no more crystals form on the surface after firing in the subsequent water bath (Fig. 7).

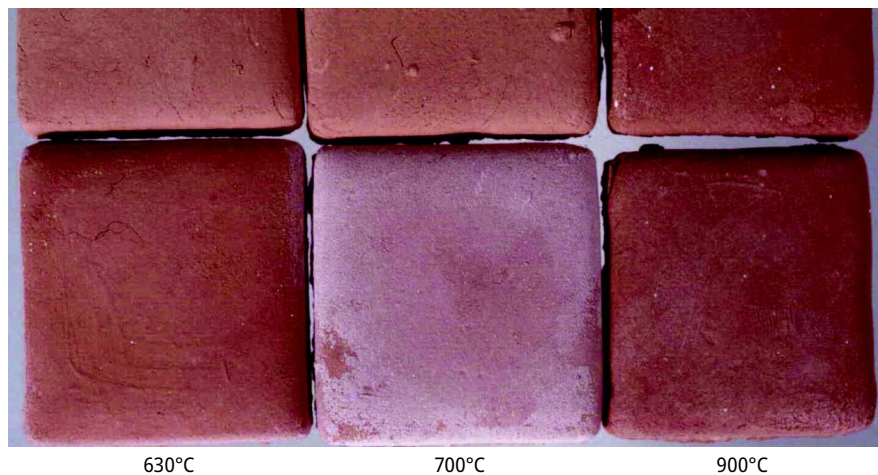


Fig. 7: Appearance of a clay specimen after firing at different temperatures: 630°C, 700°C, 900°C, exemplifying the recarbonatization process. Photograph from Gütschow 2012, table 31.

²⁵ Thickett and Odlyha 1999, 814.

²⁶ Hamer and Hamer 2004, 55.

3 Is baking and desalination the best way to preserve tablets?

3.1 Pros and cons

Due to earlier mass treatment processes, most of the tablets in today's collections have been fired. From the perspective of the time, as the previous section explored, and given the need for desalination, firing tablets was indeed an understandable choice as a preservation method. However, does that mean all these tablets are well preserved today? The answer to that question is unfortunately in the negative.

If we look at the pros and cons of firing, it becomes apparent that arguments against this method of preservation exist, and that other methods are preferable wherever possible.

Pros:

- The tablets become waterproof and suitable for immersion in a water bath for desalination and chemical treatments
- Old wax used for consolidation or adhesives can be burned out by 300°–400°C

Cons:

- Change of the original clay into a new material – ceramic – with other properties:
 - different colour
 - different size (if fired at over 800°C)
 - no longer rewritable

When considering the fact that firing makes tablets resistant to a water bath for desalination and also to chemical treatments, it is important to remember that, early on, it was assumed that hardening by firing alone would be sufficient to preserve the tablets. It was only in the second stage of the process's development, as described in Section 2, that it was realized that subsequent desalination was the key to preservation. Despite this, desalination was often neglected, as can be seen from various reports. Reade, for example, points out that many tablets were fired in the past without any subsequent desalination treatment being noted.²⁷ Additionally, according to information from an excavator from Sippar and a retired conservator from the Iraq Museum in Baghdad, it can be stated that the Sippar

²⁷ Reade 2017, 186–187, 190–192.

tablets of the 1980s were not desalinated either during excavation (where they were fired in ceramic pots filled with sand) or later in the museum.²⁸ As a result, many tablets from this Sippar collection are in very poor condition today.

Another advantage of fired tablets is the possibility to apply chemical treatments, such as to remove of calcite deposits and reduce black manganese stains, as shown in Figs 8a–b. The complete removal of old wax consolidations is also possible only by burning them out, as in the example in Fig. 8c.

However, firing also causes significant alterations to the original material. The process transforms the clay into a new material, with changes in chemical properties, colour, and, at temperatures exceeding 800°C, even size (Figs 9–11).

Reade quotes a number of reports which show that, in the past, some researchers also paid attention to details such as the colour and origin of the tablets.²⁹ Carl Bezold, in the late nineteenth century, notes:

The tablets vary in colour from deep black to a bright red, and the clay of which they are made has all the appearance of having been carefully chosen, thoroughly cleaned from sand and grit, and well kneaded. Special care must have been bestowed upon the selection of the material.³⁰

Furthermore, Reade reports that Bezold recognized that unfired clay from the Middle Tigris region can be reddish like the typical colour of fired terracotta.³¹ Conversely, Wilfred Lambert and others describe how the colour changes depending on firing temperature.³² Fired at about 650°C, tablets show a red colour; by 750°C, they turn whitish; and at higher temperatures, they start to vitrify and turn greenish at the surface.

Tablets' colour change during firing depends on the clay itself and its composition. For example, Fig. 10 illustrates the influence of sodium chloride. The samples fired at 630°C and 750°C exhibit the typical reddish colour, but at 1000°C the surface turns yellow. The marked tablet clearly shows that the lowest points of the imprinted signs remain reddish, while only the surface layer has turned yellow. In Figs 11a–b, we see an example of a high-fired tablet with a greenish layer on the outside, as described by Lambert.

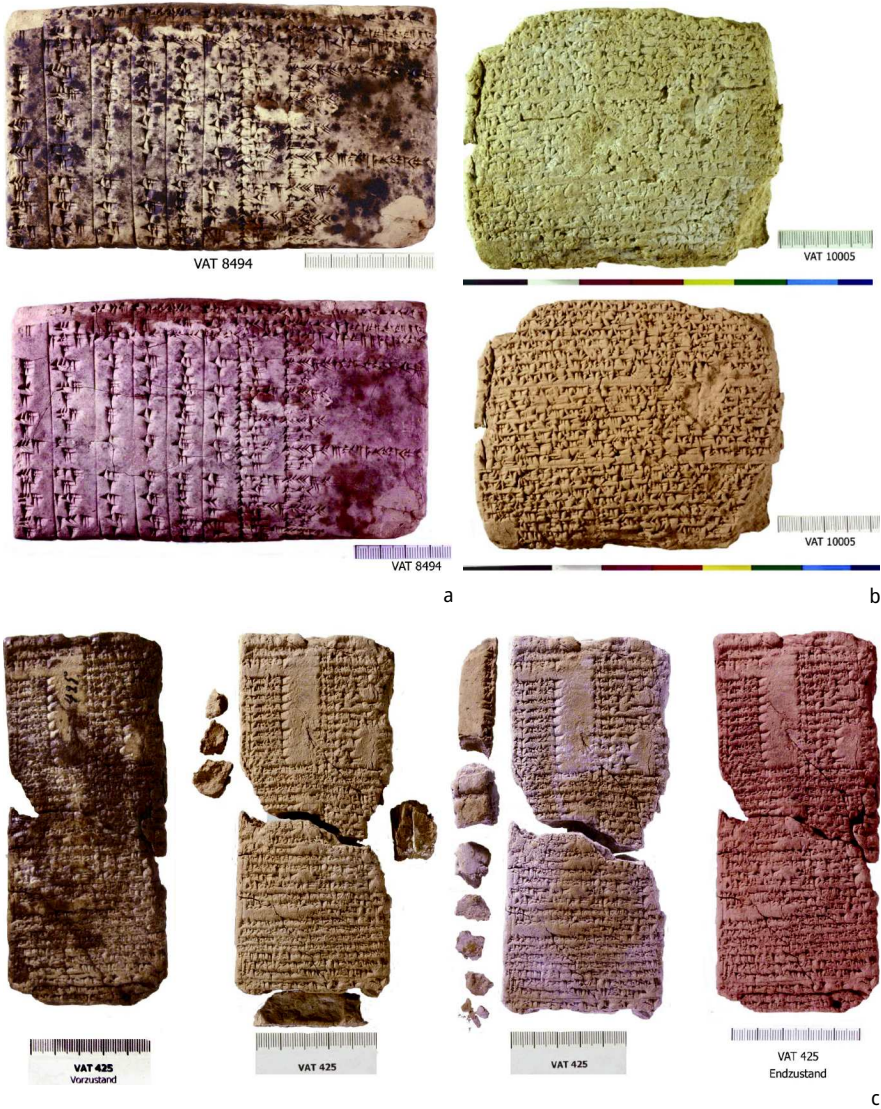
²⁸ Kindly communicated verbally by Zuhair Rajib al-Samarraee, one of the excavators of Sippar, and Shukran al-Alwe, conservator at the Iraq Museum, who restored many of the Sippar tablets in the 1980s.

²⁹ Reade 2017, 170.

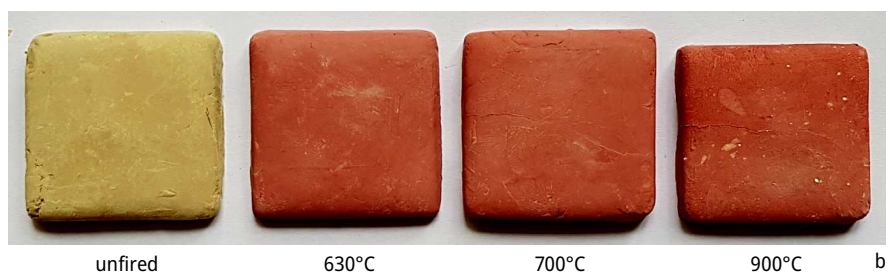
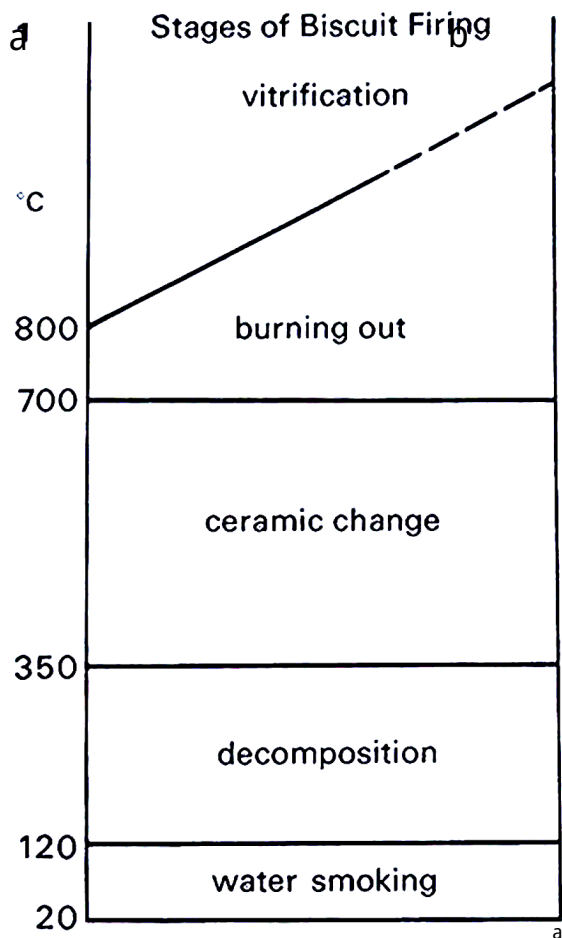
³⁰ Bezold 1889–1899, V, xv–xvi.

³¹ Reade 2017, 177.

³² Lambert 1965, 283.



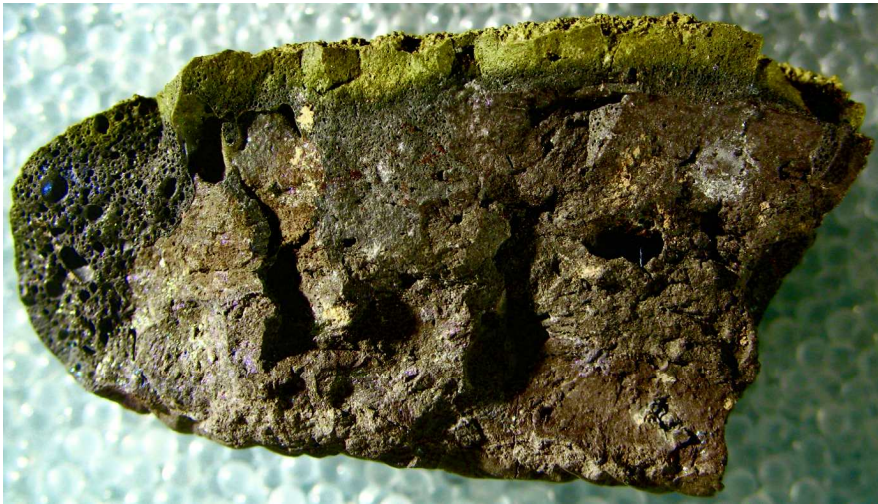
Figs 8a–c: Chemical treatments: EDTA, citric acid. Photographs from Gütschow 2012, table 7 (VAT 8494); tables 25–26 (VAT 10005); tables 12, 14–15, 18 (VAT 425).



Figs 9a-b: (a) Stages of biscuit firing. Photograph from Hamer and Hamer 2004, 139. (b) Appearance of a clay specimen after firing at different temperatures: 630°C, 700°C, 900°C. Note the shrinking of the specimen when fired at higher temperature. Photograph by Carmen Gütschow.



Fig. 10: Examples of clay dummies with added sodium chloride, fired at 630°C, 750°C, and 1000°C. The marked tablet clearly shows that the lowest points of the imprinted signs remain reddish, while only the surface layer has turned yellow.



a



b

Figs 11a–b: Example of an overfired tablet, where the clay has vitrified and the surface layer has turned greenish. (a) VAT 15746+15901; (b) VAT 15746+15901. Photographs by Carmen Gütschow; © Staatliche Museen zu Berlin, VAT.

Spataro, Taylor, and O'Flynn note that tablets from Nineveh were rarely fired for conservation because they were generally well preserved.³³ This may be attributed to their very low salt content, which minimizes potential damage. Their good condition can also be confirmed by my own observations of tablets from Nineveh, which were restored during an Italian excavation in 2022. In contrast to the tablets from places with salty soils, such as Aššur or the tablets from the highly saline soil of Uruk, they show no traces of salt contamination.

Salts like calcium carbonate and sodium chloride are the main culprits of damage. Even if water-soluble sodium chloride has been washed out, insoluble calcium carbonate can continue to deteriorate tablets. Unstable climates with fluctuating humidity exacerbate the growth of these salts. The pressure from growing crystals is what damages the tablets, leading to cracking, breaking, flaking, crumbling, and the development of crystalline growths on the surfaces and within the tablet structures, as seen in the examples below (Fig. 12).

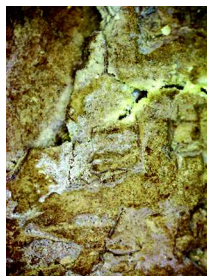
³³ Spataro, Taylor and O'Flynn 2023, 14.



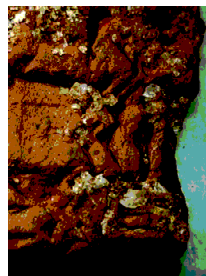
a: Salt between the structural layers; LB 551



b: Salt between the structural layers; LB 2421



c: Salt in cracks and at the surface; LB 567



d: Big crystals at the surface; LB 2421



e: Small crystals at the surface; HS 2215



f: Salt crust at the surface; LB 1865



g: Small chips due to salt activities; LB 1937



h: Fine salt crystals at the surface; W11 I61 S169



i: Salt crystals grow beneath the surface and chip them off



j: Salt activates under the old coating layer



k: Salt crystals forming at the surface



l: Fine salt needles covering the surface; RB 09 (UWS) S169

Figs 12a–l: Different examples of salt on tablets (W11 I61 S169; RB 09; LB 551, 567, 1865, 1937, 2215, 2421; unreferenced examples are from the Iraq Museum, Baghdad). Photographs by Carmen Gütschow; © Friedrich-Schiller-Universität Jena / Universiteit Leiden / DAI, Uruk-Warka-Sammlung.

In the worst-case scenario, a tablet can crumble into dust. This deterioration can affect both fired and unfired tablets alike. Fortunately, in some cases, fragments with readable surfaces can be identified, allowing for the reconstruction of at least parts of the tablet and its inscription (Figs 13a–c). To prevent such severe deterioration, it is crucial to regularly monitor collections and promptly intervene in conservation efforts when needed. This proactive approach helps to mitigate damage and preserve these valuable artefacts for future study and appreciation.





b



c

Figs 13a–c: Working on highly fragmented cuneiform tablets from the Böhl Collection, Netherlands Institute for the Near East, Leiden, in 2022. The old inventory numbers are lost because of the tablets' decay. Photograph by Carmen Gütschow; © Universiteit Leiden.

3.2 The importance of documentation and conservation

From the perspective of reading cuneiform writing, whether a tablet is fired or unfired may be insignificant. However, when considering tablets as objects, a wealth of information can be found behind the cuneiform script. This includes insights into manufacturing techniques, the choice and preparation of clay, and its quality, origin, and possibly even reuse. Moreover, close examination can reveal changes in the written content over time. Therefore, from today's conservation perspective, efforts are focused on preserving these objects as close to their original state as possible.

Reade recounts how an epigraphist disposed of fragments in the ladies' latrine simply because they lacked cuneiform and were considered worthless from his perspective.³⁴ This attitude not only results in the loss of potentially valuable information but also increases the risk of individual fragments being lost over time, as they remain detached from context and vulnerable. The act of joining fragments into coherent objects is crucial for their preservation and understanding. Documentation plays a fundamental role in this process, encompassing every step from excavation to conservation. It is essential to record the condition of objects at various stages of work, particularly noting changes such as alterations in clay colour due to firing or the joining of fragments. In the past, inadequate or lost excavation documentation has led to the loss of valuable information. Therefore, meticulous documentation and careful handling are imperative to preserving and correctly interpreting archaeological finds. An instance of improper treatment happened for example in 1975 at the British Museum, as described by Reade:

More boxes of unpublished tablet fragments from successive excavations in different areas of Kuyunjik emerged from storage. Edmond Sollberger, the epigraphist who was then responsible for the collection, decided to have them all fired in the museum before they were numbered and catalogued; during this process the groups of fragments, whose dates of arrival had previously been known, came to be mixed together, so that any information on provenance was lost. Also, once fired, the fragments no longer had their original distinctive range of colours, ranging from whitish to dark brown, and were roughly the same uniform reddish brown. Yet colour, like other typological features such as the likely size and proportions of the tablet to which a fragment once belonged, its location at top, bottom, left, right or centre of a tablet, the width of columns of text, prominent scribal habits or idiosyncrasies, and the condition and complementarities of broken backs and edges, can greatly facilitate the identification of related fragments.³⁵

³⁴ Reade 2017, 168.

³⁵ Reade 2017, 167–168, referring to Borger 1991, 44–45.

While I, as a restorer, cannot read cuneiform writing and reconstruct a tablet based on that, I can ‘read’ other aspects of the tablet, such as its material, colour, breaks, and shape. What is possible in this way can be seen in the examples in Figs 13a–c.

4 Excavation, conservation, and restoration of tablets

4.1 Treatments on site

Many cuneiform tablets are unfired at the time of excavation, which necessitates careful handling during recovery and treatment. In the following, I present my own approach to this issue. The tablets’ condition should be assessed to ensure they are stable enough for recovery. If the tablets are damp, it is advisable to allow them to dry slightly before removal. However, they must be protected from direct sunlight, as rapid drying increases the risk of cracking. It is recommended to construct a shaded area or shield the tablets with a breathable cloth while allowing gradual drying. In certain cases, temporary consolidation measures on site may be advisable. A 5–10 per cent solution of Klucel E in ethanol is recommended, as this adhesive is compatible with moisture. Alternatively, temporary consolidants like cyclododecane can be used, prepared as a saturated solution in boiling-range petroleum ether (60–95°C). However, it should be noted that cyclododecane has become quite expensive, and so its use must be carefully considered.

If the tablets are too fragile for individual removal, block excavation is recommended. This method allows the encased tablets to be carefully uncovered later, under better conditions, in a dig house or laboratory. Surface cleaning should take place only after the tablets have dried. Before cleaning, their condition must be reassessed, brushes or other tools can easily damage delicate and soft surfaces (see Section 4.3 and Fig. 21).

Reade’s article documents the challenges encountered during the earliest excavations concerning the fragile, damp state of the tablets. In it, Austen Henry Layard recounts:

many of them have crumbled away. This is owing to the nitrous nature of the soil covering the remains in Babylonia, and perhaps also of the clay out of which these objects, as well as

the pottery of the country, was made. It throws out a kind of white efflorescence, and gradually falls to pieces.³⁶

Similarly, E. A. Wallis Budge reported:

Many of the latter also had patches of a crystalline deposit adhering to them; and when an attempt was made to remove them the tablet crumbled in the hand, leaving the deposit intact. [...] Many of the unbaked tablets had broken as they were being taken from the ground, and those that were removed in an entire state often cracked and broke into fragments, or crumbled into dust.³⁷

Reade also quotes Hormuz Rassam, who reported in 1880: 'Unfortunately all the inscriptions found are on unbaked clay, which get very much damaged as soon as they are exposed to the air'.³⁸ Again, according to Rassam 'the clay of which they were made had become so fragile that as soon as they were exposed to the air they crumbled to pieces'.³⁹ Finally, according to Hermann Hilprecht, the tablets excavated at Nippur

have suffered exceedingly from the humidity of the soil in which they lay. In many cases the salts of nitre contained in the clay had crystallized and caused the gradual disintegration of complete documents, or at least, the flaking off of the inscribed surface. Frequently they crumbled to dust immediately after their discovery or soon afterwards, on their way from Nuffar to Constantinople.⁴⁰

4.2 Restoration of tablets previously consolidated with wax and adhesives

4.2.1 Tablets consolidated with wax

In the past, tablets were sometimes consolidated in the field with wax to facilitate recovery. The wax used was typically either beeswax or paraffin.⁴¹ In most cases, the wax was later burned off, but some tablets remain impregnated with wax to this day (see the examples in Figs 8c and 14). As shown in Fig. 14, the wax often did not penetrate very deeply. This situation can allow salt crystals beneath the sur-

³⁶ Layard 1853, 564, quoted in Reade 2017, 180.

³⁷ Budge 1925, 147–149, quoted in Reade 2017, 181.

³⁸ Reade 1986, xxi, quoted in Reade 2017, 184

³⁹ Reade 2017, 184.

⁴⁰ Hilprecht 1903, 415–416, quoted in Reade 2017, 185.

⁴¹ Delougaz (ed.) 1933, 41–42; Reade 2017, 194.

face to become active, leading to the detachment of the inscribed layer due to crystal growth.

Two conservation options are available for such tablets. First, the tablet can be fired to melt the wax, after which it may undergo desalination (as illustrated in Fig. 8c). If firing is not an option, the wax can be reduced using a heated spatula and petroleum ether, which cleans the surface. Following this, the core must be consolidated to prevent further salt activity, and any detached fragments can be re-adhered (Fig. 14). Due to residual wax in the structure, the adhesive may take longer to cure.

As an alternative to wax for temporary consolidation during excavation, cyclododecane can now be used (as described in Section 4.1). Unlike wax, cyclododecane allows the tablet to remain unfired after recovery, as it sublimates from the material without leaving residues.



Fig. 14: Wax-consolidated tablet, shown damaged and after restoration in 2018 (LB 2388). Photographs by Carmen Gütschow; © Universiteit Leiden.

4.2.2 Tablets consolidated with adhesives

Across the decades, a variety of adhesives and consolidants have been used on tablets, including cellulose nitrate, shellac, and polyvinyl acetate (PVA). Among these, cellulose nitrate products have been particularly widespread for both consolidation

and adhesion and can be found in many collections.⁴² However, cellulose nitrate is characterized by very poor aging properties and should no longer be used.

Cellulose nitrate lacquers typically contain plasticizers, which gradually evaporate over time, causing brittleness, hairline cracks, and shrinkage (Fig. 15). This degradation process accelerates at higher temperatures. Furthermore, exposure to light leads to yellowing or browning.⁴³ I could observe the speed of this process during excavations in Syria, in particular in 2000 in Tell Sheikh Hamad and in 2002 in Qatna, where a clear adhesive in a bottle turned a bright orange colour within a few weeks. In Qatna, wall painting fragments that a conservator had consolidated and adhered with cellulose nitrate in 2001 had already browned significantly within just one year.



Fig. 15: Example of aged, brownish, and brittle cellulose nitrate glue. Photograph by Carmen Gütschow.

⁴² Reade 2017, 194, with reference to Delougaz (ed.) 1933.

⁴³ Ziegler et al. 2014; Down 2015, 61–62

Shellac exhibits similar behaviour, as it tends to darken and become brittle over time.⁴⁴ PVA also demonstrates poor aging properties due to bond transformations that occur over time, leading to increased stiffness, brittleness, and insolubility.⁴⁵ Depending on the specific type of PVA adhesive, slight yellowing or mild to severe whitish clouding has also been observed.

Today, I recommend using other adhesives that take into account the climatic conditions where they are applied and their aging resistance. Furthermore, adhesives in the form of powder or granulate should take preference, as they are easy to transport for international projects and have a longer storage life. The necessary solvents – such as ethanol (96 per cent or higher if possible), acetone, deionized water, and benzine – are usually readily available in medical or chemical shops. Tablets can be consolidated and bonded with Polyvinylbutyral 30 (PVB 30) in ethanol. Depending on the mixing ratio with solvents like ethanol or acetone, PVB 30 can be used in a thin concentration as a consolidant or at 25 per cent and above as glue. The glass transition point⁴⁶ of PVB 30 is 68°C,⁴⁷ making it a better choice than the popular Paraloid B-72, which has a glass transition point of just 40°C.⁴⁸ In a country like Iraq, where the temperature often exceeds 40°C, this consideration is crucial when selecting adhesives for conservation. Paraloid B-44, with a glass transition point of 60°C, could also be an option.⁴⁹ Another adhesive for light consolidation is the hydroxypropyl cellulose Klucel E.⁵⁰ It can be dissolved in water, ethanol, and acetone and can also be mixed with PVB and Paraloid B-44.

⁴⁴ Down 2015, 63–64.

⁴⁵ Down 2015, 67.

⁴⁶ Glass transition temperature (T_g): the temperature at which an amorphous polymer turns from a hard, brittle condition into a soft, viscous condition. See Horie (ed.) 2010, 430.

⁴⁷ Kremer-Pigmente, data sheet Polyvinylbutyral 30, <<https://www.kremer-pigmente.com>> (accessed on 4 July 2024).

⁴⁸ Kremer-Pigmente, data sheet Paraloid B-72, <<https://www.kremer-pigmente.com>> (accessed on 4 July 2024).

⁴⁹ Kremer-Pigmente, data sheet Paraloid B-44, <<https://www.kremer-pigmente.com>> (accessed on 4 July 2024).

⁵⁰ Kremer-Pigmente, data sheet Klucel E, <<https://www.kremer-pigmente.com>> (accessed on 4 July 2024).

4.3 Cleaning tablets

Before cleaning a tablet, the condition of the surface must be checked. If the tablet is wet, soft, or flaky, cleaning with brushes can damage or destroy the inscription (Fig. 16). Close inspections of collections often reveal that many tablets could benefit from more thorough cleaning.



Fig. 16: Example of damage caused by cleaning the surface with a brush while the tablet was wet, Iraq Museum, Baghdad. Photograph by Carmen Gütschow.

As in the past tablets were often only brushed, the fine clay-sand was pressed deep into the wedges and thus compacted on the surface. As a result, many tablets are not clearly readable, and details are obscured. Another problem is that tablets were not cleaned of soil or were only lightly brushed before firing. Consequently, the clay-sand layer covering the tablet could sinter together with the tablet's clay during firing. The sintered sand, now fused with the tablet's surface, can become extremely difficult or even impossible to remove, especially on high-fired tablets. This situation can be observed, for example, on some tablets in the Böhl Collection

of the Netherlands Institute for the Near East in Leiden (Fig. 17). Hermann Hilprecht also recognized this fact in the past:

The often advised baking of such tablets was not only useless, but proved repeatedly even most damaging, as it accelerated the process of dissolution and hardened the dirt, filling the cuneiform characters to such a degree that it could not be removed later.⁵¹

The sand deposits often resemble the material of the tablets, making cleaning under a microscope the most effective method for distinguishing between the two. Tablet material tends to appear denser and usually somewhat finer in texture. By lightly moistening the surface with ethanol, the sand deposits typically appear slightly darker, making it easier to differentiate between the tablet material and the sand to be removed. It is not recommended to moisten unfired tablets with water, as this can cause them to swell and soften. In contrast, ethanol evaporates quickly, softening the clay only briefly and minimizing the risk of damage.

Under a microscope, the cuneiform script can be cleaned wedge by wedge with a pointed scalpel blade (blade no. 11), producing significant improvements, as shown in Figs 18–20. Although this type of cleaning is time-consuming, it allows for very precise work and selective response to fragile conditions.

⁵¹ Hilprecht 1903, 415–416, quoted in Reade 2017, 185.



Fig. 17: Example of a tablet with a sintered soil crust caused by firing (LB 2644). Photograph by Carmen Gütschow; © Universiteit Leiden.

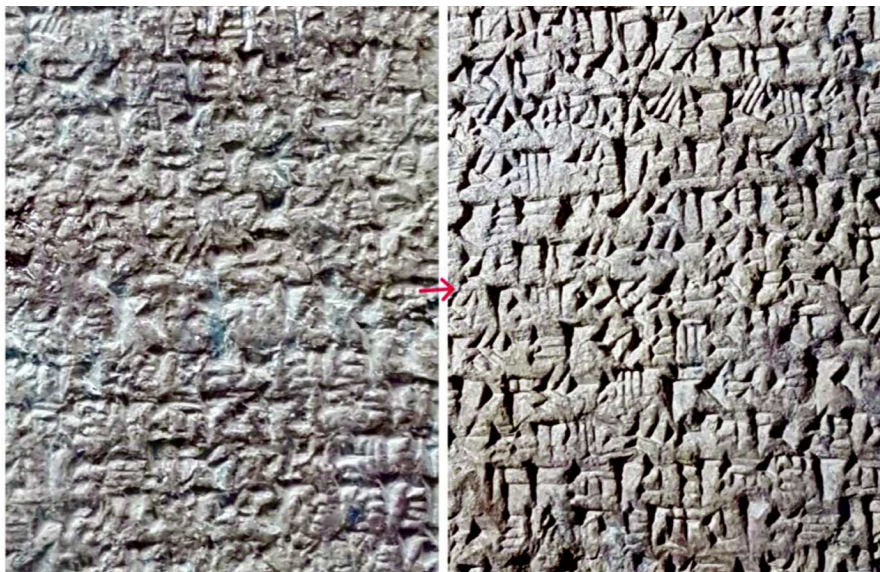


Fig. 18: Portion of a cuneiform tablet shown before and after cleaning under a microscope, Iraq Museum, Baghdad. Photograph by Carmen Gütschow.



Fig. 19: Portion of a cuneiform tablet showing various stages of cleaning under a microscope (LB 2016). Photograph by Carmen Gütschow; © Universiteit Leiden.



Fig. 20: Portion of a cuneiform tablet shown before and after cleaning under a microscope, Iraq Museum, Baghdad. Photograph by Carmen Gütschow.

Another question regarding cleaning concerns the spots and layers of black on some tablets. These marks can vary from thin and pale to thick and deep black. The Rathgen-Forschungslabor in Berlin analysed some tablets showing such stains and layers as part of my diploma thesis in 2003, identifying them as manganese.⁵² While these manganese spots or layers do not damage the tablets, they can impair the readability of the cuneiform. It is often observed that the stains form more prominently on one side of the tablet, and they are typically observed on the surface of the tablet some time following excavation and first study, suggesting these marks form after the tablet has dried. As the tablets dry, manganese migrates to the surface with the evaporating water. This would explain why one side is often more affected – typically the side facing up during drying. The manganese may originate from the soil or, as analyses by Etsuo Uchida and Ryota Watanabe have shown, could be precipitated by manganese-oxidizing microbes.⁵³ Chemical treatments can remove or at least reduce these black manganese stains on fired tablets (see Fig. 8a). Treatments with hydrogen peroxide, thioglycolic acid, or ethylenediaminetetraacetic acid (EDTA) are conceivable. All methods require neutralizing follow-up rinses with water. My recommendation is EDTA, as it can also remove calcite deposits if present.⁵⁴

⁵² Gütschow 2012, 76 and Anhang 1–2.

⁵³ Cited in Spataro, Taylor and O'Fynn 2023, 4.

⁵⁴ Gütschow 2012, 75–80.

5 Can tablets be preserved without firing them?

It often surprises people that unfired clay tablets have survived to this day without disintegrating. In fact, numerous unfired tablets in collections remain in good and stable condition. The misconception that only fired tablets can endure likely stems from the poor experiences of early excavations. As Reade notes, early reports frequently mentioned that unfired tablets crumbled to dust shortly after excavation or broke apart within a short time in collections.⁵⁵

Such outcomes led to the adoption of the practices of local looters, who would harden tablets in hot ash at several hundred degrees or fire them in kilns at temperatures ranging from 600°C to 750°C or higher.⁵⁶ However, as was eventually realized, firing alone was insufficient to ensure the tablets' ongoing preservation (see Section 2). The primary issue lay in the often high salt content of the clay tablets. Both water-soluble salts, such as sodium chloride, and insoluble salts, such as calcium carbonate, are present in the clay's structure or absorbed from burial in the soil. These salts are the main culprits behind damage to both unfired and fired tablets (see also Section 3 and Fig. 12).

Reade mentions numerous reports from early excavations and museums laboratory records, also documenting cases where locals excavated tablets for the market. A recurring observation is that most tablets from early excavations were not desalinated after firing, either in the field or at museums.

Unfired clay objects are not inherently prone to decay. Their preservation depends largely on the climatic conditions under which they are stored. To mitigate the salts' damaging effects, the environment must remain dry and stable, preventing salt activation due to moisture or fluctuations in humidity. The lack of desalination after firing, combined with potentially suboptimal and unstable storage conditions, often led to further deterioration of the tablets due to salt activity over time.

In 2001, a team from Heidelberg University excavated nearly three hundred clay tablet fragments in Aššur. During the campaign, I led the restoration of just over fifty of the excavated tablets. All the clay tablets were unfired and exhibited a high concentration of salts, with some entirely covered by a salt crust 1–2 mm thick (Fig. 21). Since firing and desalination were not feasible in that context, the tablets were cleaned of soil and surface salt crusts using scalpels. Where necessary, they

⁵⁵ Reade 2017, 163–197.

⁵⁶ Reade 2017.

were consolidated with a thin 3–5 per cent solution of PVB 30 in ethanol, not only to stabilize the structure but also in an attempt to encapsulate the salt.

In 2022, an opportunity arose for me to re-examine the tablets at the Iraq Museum. All the tablets were in pristine condition, just as they had been when handed over two decades earlier. Not a single tablet showed damage from salt activity. A year later, the unrestored fragments were also inspected. While a few had cracked or broken, they were otherwise in good condition. Considering the tumultuous conditions the Iraq Museum faced during the wars, it is reasonable to assume that storage conditions over the past twenty years were far from ideal. Yet, the tablets had not disintegrated into dust (Figs 22–23). It was both reassuring and gratifying to see that the restoration efforts undertaken in 2001, under the simplest excavation conditions, had proven so successful after so long. Therefore, based on past experiences, it can be said that with proper treatment, packaging, and storage, the degradation process can be significantly mitigated.



Fig. 21: The author while restoring a Middle Assyrian tablet in the excavation house of the Aššur expedition in 2001. Photograph by Peter A. Miglus.

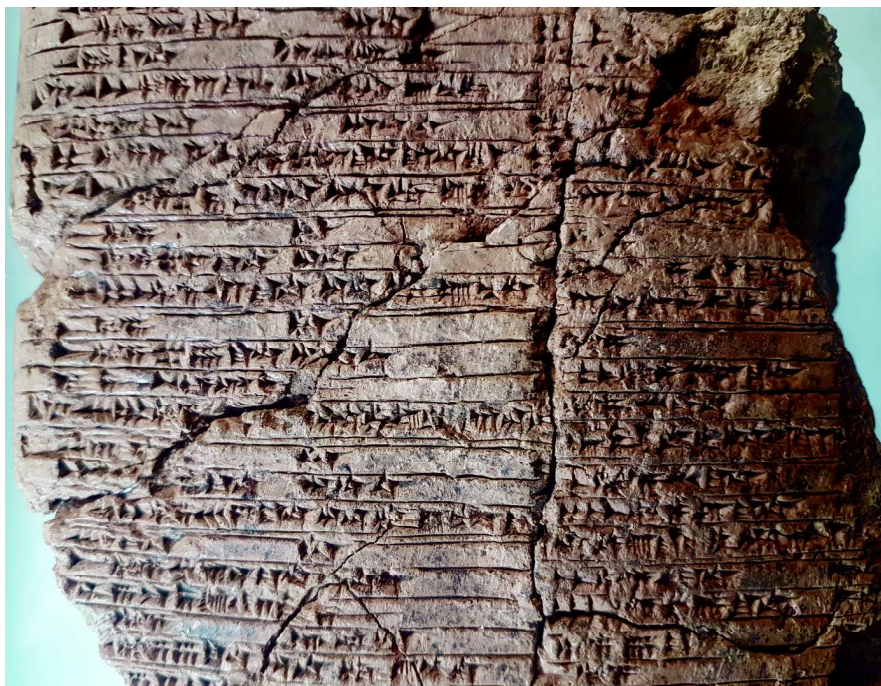


Fig. 22: Unfired tablet in 2022, twenty-one years after restoration. Photograph by Carmen Gütschow.

Since the 1990s, the Louvre Museum in Paris has been experimenting with an alternative to the firing process, looking for a method that minimally affects the chemical and mineralogical character of the tablets. They use ethyl silicate, or tetraethyl orthosilicate, to consolidate the tablets.⁵⁷ This treatment allows water to percolate through the clay, enabling desalination of the tablets. After more than twenty years, the results have been positive, with no observed negative side effects such as colour changes or microcracks.⁵⁸ In a recent article, Anne Liégy describes a slight change of colour in fabricated samples but no colour changes in the original samples.⁵⁹ Importantly, the experimental treatment being tested at the Louvre is time-consuming and can take several months to complete. This factor must be considered when evaluating potential treatments.

⁵⁷ Liégy 1996; Liégy 2012; Liégy et al. 2010.

⁵⁸ Tiennot et al. 2020, 23.

⁵⁹ Liégy 2023, 61–62, 65. The possible reasons for this phenomenon, however, are left open.



Fig. 23: An unfired tablet from the same collection as in Fig. 22, which could not be restored in 2001, in 2022. Although the two tablets have been stored together, the difference in their state of preservation is evident. Photograph by Carmen Gütschow.

6 Packing and storing

Preventive conservation must include careful consideration of packing and storing objects. Since tablets are primarily damaged by salt activity, they must be stored in a dry and stable climate. Lining boxes with cotton or cloth is counter-productive, as these materials absorb and retain moisture, potentially causing damage. Therefore, outdated packaging materials in collections should be urgently replaced.

Suitable materials for storage include acid-free cardboard boxes and polyethylene (PE) containers. Both PE-LD (low density) and PE-HD (high density) options are appropriate. PE-LD is commonly made into bag and sheet forms, while PE-HD is used to construct sturdier objects, like boxes. The key factors in choosing PE as a packaging material are its durability and the absence of plasticizers.

Acid-free materials are essential, as acids – such as the formaldehyde⁶⁰ in cardboard or wooden crates – can trigger chemical reactions with salts, leading to efflorescence on the tablets. For lining, materials like PE foam (for example, Plastazote) and acid-free tissue paper are recommended. Whether the tissue paper is buffered or unbuffered is less critical for clay tablets; the primary consideration is that it is acid free (Figs 24a–d).

Regular inspections of the objects are also highly recommended to detect potential damage early and respond promptly. Figs 13a–c and 14 illustrate how extensive decay can become if timely interventions are not made. This deterioration can progress to complete pulverization of the tablet, affecting both unfired and fired tablets alike.

⁶⁰ Hilbert 2002.



Figs 24a–d: Example of new packaging in acid-free cardboard boxes, lined with acid-free silk paper and Plastazote (a PE foam), Böhl Collection, Netherlands Institute for the Near East, Leiden, 2024. Photographs by Carmen Gütschow; © Universiteit Leiden.

7 Conclusion

From a restorer's perspective, one should always try to preserve the original properties of an object as much as possible. In the case of clay tablets, this generally means preserving the unfired character. The history of restoration shows that, in the past, scientists focused solely on preserving the cuneiform script. The change in the material and its properties due to firing was accepted or, in the case of the subsequent desalination bath, desired. Today, scholars also look at the clay tablet more comprehensively, as an object that reveals more than just the text

written on it. As a result, the understanding of preserving the original has also grown among scientists. There are limits, of course, and a certain amount of intervention is necessary for conservation, but it should distort the object as little as possible. Both the experimental treatment being tested at the Louvre and my own approach show that it is possible to find conservation methods that largely preserve the original characteristics of clay cuneiform tablets.

Abbreviations

EDTA = ethylenediaminetetraacetic acid.

HS = Frau Professor Hilprecht Collection of Babylonian Antiquities, Friedrich-Schiller-Universität Jena.

LB = De Liagre Böhl Collection, Universiteit Leiden, Netherlands Institute for the Near East.

pXRF = portable X-ray fluorescence.

RB = 'Restoration Berlin', temporary numbering for restoration treatment.

SEM-EDX = scanning electron microscopy with energy dispersive X-ray spectroscopy.

VAT = Vorderasiatische Abteilung, Tontafel, at the Staatliche Museen zu Berlin – Preußischer Kulturbesitz, Vorderasiatisches Museum.

X-ray CT = X-ray computed tomography.

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Jon Taylor

Temporality on Clay Tablets: When the Component Parts of a Cuneiform Document Were Committed to Clay

Abstract: Clay tablets with cuneiform inscriptions are more complex records than they may appear at first glance. A range of non-verbal marks and physical features is preserved in the clay, alongside the inscription. They reveal aspects of the tablet's 'biography' – the stages in which parts of it were created or modified. A non-sequential order of inscription is evident. These features in turn imply administrative systems in which tablets play one of several roles in a sequence of documents. Rather than being spontaneous verbatim quasi-'photographic' records of short, specific moments in time, tablets can be pre-prepared, contain abstracted versions of other texts, or be composed post-factum. Their content can be modified in various ways, at points throughout an extended lifetime.

1 Introduction

Cuneiform was characteristically written on tablets of moist clay. This material offers an indefinite lifetime of usage. Theoretically, a piece of clay used to write the first ever tablet could have been handed down from scribe to scribe, constantly reused over the entire 3500-year span during which cuneiform was written, excavated two millennia later looking as crisp and clear as the day it was last inscribed, then be used again by cuneiform scholars for thousands more years with no discernible impact on its properties. In one sense, then, the clay tablets on which cuneiform was normally inscribed are the ultimate never-ending manuscripts, with enormous advantages over paper, papyrus, parchment, bark or any other organic material support. But a distinction must be made between material and object. While clay may be reused easily, the same cannot be said of tablets made from clay. Thus clay is actually much more restrictive than those other media. It must be the right level of consistency for the wedges to be impressed comfortably and retained. Therefore, there is a limited period during which a scribe could impress text on the tablet surface.

After the clay had started to dry, the stylus would impress more shallowly than when the clay was moist. This is visible to the modern observer. One solution to the problem of clay's limited inscriptional period would have been to resort

instead to other media, such as wax-filled writing boards,¹ which were known from at least the end of the third millennium BCE; there is also evidence for writing on animal skin.² These boards would have had other advantages, too, such as being reliably ready whenever needed. But they clearly were not without their own issues, since clay remained dominant until the last days of cuneiform. Other avenues were also open to the scribes. Clay can be kept moist through the application of a damp cloth, for example, and this knowledge must have been available to the scribes. The technique could have been used to extend the inscriptional period.

The inscriptional period matters so much, because it had to be reconciled with the period over which social and administrative processes took place. Given that our historical reconstructions derive overwhelmingly from texts found on clay, it is vital that we understand what those tablets actually represent. We need to consider the temporality of tablets. Do tablets record a single point in time or do they document a series of processes over a more extended period? Are they contemporaneous records or are they composed post factum? Many questions about scribal practice have remained frustratingly beyond our understanding. At what point in their work did they put stylus to clay? Would they write simply from beginning to end? How long did it take them to write a tablet? Would they inscribe a tablet in a single session or more? And would they return to a tablet after completing the primary inscription? For how long were they able to keep the clay moist? Could they re-moisten the clay? Crucially, *did* they employ these techniques?

The window of use is explored via several phenomena related to the material character of clay in the scribal world. These are not treated in detail here, but their relevance to the present topic will be noted. They include blanks, sealing in its many forms, other writing found on tablets, check marks of various sorts, erasure and re-inscription, palimpsests, cancellation marks, enveloping, firing of tablets, and textile impressions. Examples of each phenomenon are cited;³ no claim to completeness is made. Understanding of the phenomena and their implications will require detailed study of individual text groups across the cuneiform corpus. The following overview is restricted to cuneiform as attested in the Mesopotamian area; that is, modern Iraq and Syria.

¹ See Cammarosano et al. 2019 for an overview.

² See Molina and Steinkeller 2023.

³ It is important that readers are provided with examples of the phenomena they can examine. This necessitates the citation of a bewildering set of Assyriological abbreviations for museum collections and secondary publications. A useful guide to these can be found at <<https://cdli.mpiwg-berlin.mpg.de/abbreviations>> (accessed on 5 February 2025).

2 Previous studies

While study of the material aspect of tablets enjoyed a brief floruit in the late nineteenth and early twentieth century, the topic has been of limited interest to Assyriology until recent years. The phenomenon of writing on a dry tablet was highlighted already by Theophile Meek in 1935, noting of the Old Akkadian texts from Nuzi that '[a] few tablets contain lightly incised characters, made apparently after the clay was nearly dry'.⁴ He offered no further comment on the phenomenon. Dietz Edzard noted what he called a rare example of the co-occurrence of cuneiform and linear writing in the form of a tablet from third-millennium BCE Ebla in Syria.⁵ He hypothesised that the scribe was interrupted, and while he was away from his duties the clay dried. Upon his return, he completed the remaining text using incised lines, possibly with the intention of going back over them at some future point to impress them as normal having re-moistened the tablet (which never happened). He noted that this text was written using the same signs and probably also the same 'dynamic', from which we might deduce that the same person was responsible. Dominique Charpin observed that occasionally towards the end of large tablets the inscription changes its character, due to the drying of the clay.⁶ Many further examples of writing on dry clay can be cited. They can now be better understood as revealing the standard working practices of the range of officials or individuals who produced the documentation we study. Other indications of these practices were observed in a series of publications by Joachim Marzahn,⁷ also together with Manfred Krebern timer and Gebhard Selz.⁸ These include 'check marks', which were the subject of a dedicated study by Ilya Arkhipov,⁹ who provided a wealth of examples as context for his discussion of their use in Old Babylonian Mari. Jeanette Fincke extended the discussion with relevance to first-millennium scholarly texts.¹⁰

⁴ Meek 1935, ix.

⁵ Edzard 1980, 548.

⁶ Charpin 2002, 489, n. 15.

⁷ Marzahn 2020.

⁸ Krebern timer, Marzahn and Selz 2005.

⁹ Arkhipov 2019.

¹⁰ Fincke 2021, 58–69.

3 Pre-production

It remains unknown whether scribes sourced and processed their own clay. There are also still questions over whether they made their own tablets. Whatever the answers may be, it is the case that, at least in some contexts, tablets could be made in advance of need. This is shown by the existence of blanks.¹¹ This practice could be helpful where scribes were writing many tablets or needed to have one available at short notice. But it also comes with logistical issues, in that the ‘drying clock’ started before the scribe was ready to begin the inscription process. We must assume a certain amount of wastage, which could of course be recycled or disposed of. The practice nevertheless demonstrates that tablets stayed, or were kept, moist for a period of time.

A second type of pre-preparation can be found. Blank lines within inscribed tablets can reveal important information about how the documents were produced. Some blank lines relate to document formatting, creating visual indicators of content type and facilitating access to key metadata. It is common, for example, to leave a blank line before giving the total, the date, or noting the nature of the transaction. Others are incidental by-products of the completion of documents of relatively limited length on tablets of more-or-less standardised size. Yet others are more telling; they reveal how the document was planned and the order in which its components were tackled (see also Section 13 below). These in turn shed light on the bureaucratic mechanisms recorded through the tablets. A very simple example of this is Old Babylonian loan YBC 4912 (YOS 13 451), which has a section marked for the names of witnesses, yet these were never written. This kind of sequence is not surprising. More sophisticated examples are actually commonplace. For example, Ettalene Grice already commented on the use of ‘templates’, citing two inventories that contain entries for types of animal yet lack numbers associated with them (YBC 4801, YBC 4802);¹² CBS 3306 (BE 15, 133) is an apparently unfinished Middle Babylonian account.¹³ A systematic case is offered by the field survey texts from Ur III Girsu, where the yields (occurring throughout the text)

¹¹ Some examples are listed in Taylor 2011, 8. Further examples from the late third millennium were found at Tello among mixed administrative and school tablets. See also Charpin 1989, 58. Individual tablets cited can be found in <<https://cdli.ucla.edu/>> (accessed on 7 October 2024). Ur III tablets can be found in <http://bdtns.filol.csic.es/index.php?p=formulario_urIII> (accessed on 7 October 2024). Old Babylonian tablets can be found in <<https://www.archibab.fr/>> (accessed on 7 October 2024). Neo-Assyrian tablets can be found in <<https://www.ebl.lmu.de/>> (accessed on 7 October 2024).

¹² Grice 1919, 15.

¹³ Grice 1919, 15. See further the incomplete legal text BE 14, pl. XI.

are often left blank (see further Section 13 below). Other features also point to pre-preparation. Westenholz cited an assignment of workers from Early Dynastic IIIb Nippur, where in many cases the numbers were written after the names, while the tablet was still moist.¹⁴ Ingo Schrakamp noted a similar example from Old Akkadian Adab, and adds another from Old Akkadian Girsu.¹⁵ Walther Sallaberger presented further evidence from the Ur III Period:¹⁶ not all numbers in a list are filled; and some names lack the ‘1’ mark, indicating their general availability, but absence from the specific work assignment.¹⁷

Hartmut Waetzoldt and Fatma Yildiz presented an Ur III tablet with an administrative text on one side and an incantation on the other.¹⁸ They hypothesised that either the scribe realised he would not complete the administrative exercise, so returned it to the pile of pre-prepared tablets, where another scribe retrieved it and used it (possibly for private purposes) to write an incantation, or that this was a school exercise, where one scribe wrote the administrative exercise and another the incantation.¹⁹ Based on what we now know about Ur III education,²⁰ that latter proposal is the more likely. Whether one or two scribes were involved is irrelevant to the present topic.

4 Sealing

Documents could be sealed using cylinder, stamp, or ring seals, as well as substitutes such as fingernails, hems, stones or the like.²¹ The sealing could be performed before or after the main inscription. In either case, sealing and inscription would need to happen within a limited time, as both required the clay to be in moist condition. Here again, the process was not always brought to completion, as

¹⁴ Westenholz 1975b, no. 53.

¹⁵ Schrakamp 2008, 681.

¹⁶ Sallaberger 1999, 282–283.

¹⁷ Note also Maeda 1984, 38 on numbers being absent or erased.

¹⁸ Waetzoldt and Yildiz 1986. They comment (p. 292, n. 4) that experiments revealed that an inscribed tablet could not be re-moistened to the point where it could be written as normal, but that a tablet whose surface had dried out could be scratched away and the remaining clay re-moistened to allow re-inscription. We can be confident that this technique was not routinely employed by the scribes.

¹⁹ Waetzoldt and Yildiz 1986, 292.

²⁰ See Taylor and Rey 2025.

²¹ I would like to thank Diana Stein for suggesting references for this section.

suggested by some blank tablets that bear seal impressions²² such as BM 86451, an Old Babylonian administrative document; BM 23688, an Old Babylonian tablet with some traces including of a seal; BM 78747, an uninscribed envelope around an inscribed Old Babylonian tablet, sealed with textile impressions; BM 62892, a small, round Neo-Babylonian tablet with ring seal impressions. These examples are to be distinguished from trial impressions of seals, which are also sporadically attested. A category of tablet is known from the Old Akkadian Period which is sealed but uninscribed.²³

Sealing studies have illuminated questions such as which tablets were sealed, where on those tablets the impressions were made, and who by. An aspect that has received less attention, but which may be more significant than it at first may seem, is *when* the seal was applied to a document. Specifically, did the inscription or sealing happen first? This has consequence for our understanding of the reality behind the production of the document, considering the identity of the sealer and purpose of their sealing on the one hand and the moment in the process when the document would be drawn up and who by on the other. The difference is usually clearly visible in the clay. Impressing a seal involves the application of pressure on moist clay. This inevitably distorts any cuneiform inscription already made; the wedges become narrower and can be shallower.

Carney Gavin commented that all Ur III tablets in the Andrews Collection (mostly from Drehem or Umma) were written then sealed.²⁴ Giovanni Bergamini posited that the clay would need to be harder (that is, drier) for sealing than for unsealed documents, with the resultant shallower wedges complicating the task of distinguishing order of impression.²⁵ This claim has not yet been argued in detail in the literature. He noted that in his corpus of Ur III texts from Umma, most were sealed before being written. This he interpreted as being akin to stamped paper, certifying the origin of the document. Claudia Fischer by contrast noted that in her corpus from Ur III Girsu tablets were typically written before being sealed, with a few exceptions where the obverse was written, then both sides sealed, before the reverse being inscribed.²⁶ Atsuko Hattori observed the same at Nippur, citing also a personal communication from Rudi Mayr confirming the same for Umma (thus effectively contradicting Bergamini's observation).²⁷ A slightly differ-

²² In some cases perhaps the surface of this object has instead been lost to water damage.

²³ See e.g. Rakic 2018, 90.

²⁴ Gavin 1988, 73.

²⁵ Bergamini 1991, 117.

²⁶ Fischer 1997, 99.

²⁷ Hattori 2001, 98.

ent practice was followed with envelopes, where a change is visible about half-way through the period.²⁸ In the early years, the envelope is sealed before the text is inscribed, while in later years the opposite is usual. Again the same pattern was observed by Hattori at Nippur.²⁹ In some cases, the main text is inscribed, then the envelope sealed, before finally the summary and date are added. Examples are also given of tablets where the text is started, then the tablet sealed, before the date was inscribed last (BM 14459, BM 20520). Christina Tsouparopoulou noted that the order in which inscription and sealing take place seems to depend on the official, with most Drehem tablets being written before being sealed.³⁰ She notes that while seals could indeed be used to produce the equivalent of 'letterhead paper', other functions were also attested.³¹ She drew attention to tablet AUAM 73.1259, which was sealed but also contains several erasures, raising questions as to its function. Judging by the images, that tablet seems to have been written on the obverse, sealed on the obverse, written on the reverse, then most of the reverse erased. A systematic study of such features could yield significant information about the varying bureaucratic processes in place.

For Assyria, Mogens Trolle Larsen and Beatrice Teissier observed that Old Assyrian envelopes were sealed prior to inscription.³² Claudia Fischer noted that tablets and envelopes were inscribed prior to sealing at Middle Assyrian Kar-Tukulti-Ninurta,³³ while Stefan Jakob described contemporary sealed tablets from Tell Chuera as being sealed first, as though watermarked.³⁴ Susanne Herbordt argued that Neo-Assyrian tablets (including legal texts and letters) were sealed before being inscribed.³⁵ She suggested two possible reasons for this. Either the sealer, who was a different person from the scribe and was illiterate, would have been indifferent to when the inscription was made, or that there was a preference for sealing when the clay was moister (contrasting with Bergamini's assumption). Marilyn Kelly-Buccellati similarly recorded Terqa texts as being sealed first, as did Dominique Beyer for Emar legal texts.³⁶ For Babylonia, Teissier noted that at Old Babylonian Sippar seals were overwritten by text,³⁷ while Gudrun Colbow sug-

²⁸ Fischer 1997, 98–99.

²⁹ Hattori 2001, 89.

³⁰ Tsouparopoulou 2015, 82–83.

³¹ Tsouparopoulou 2015, 80–81.

³² Larsen 1977, 94; Teissier 1994, 11.

³³ Fischer 1999, 120.

³⁴ Jakob 2009, nos 22–28.

³⁵ Herbordt 1992, 37–41.

³⁶ Kelly-Buccellati 1986, 134; Beyer 2001, 428.

³⁷ Teissier 1998, 112. Further Renger 1977, 76 for the habit in Old Babylonian generally.

gested that late Old Babylonian tablets were sealed first.³⁸ Gisela Stiehler-Alegria Delgado recorded the same for Middle Babylonian tablets.³⁹

Heather Baker and Cornelia Wunsch observed that for the tightly controlled Neo-Babylonian land sale texts, drafted and sealed by a small group of scribes, sealing preceded inscription.⁴⁰ Erica Ehrenberg likewise noted that tablets from Late Babylonian Uruk were sealed before inscription.⁴¹ Stefania Altavilla and Christopher Walker also noted several examples of tablets from Late Babylonian Sippar where the sealing precedes the inscription.⁴² The phenomenon should be investigated in detail.

5 Other writing

The languages written in cuneiform (meaning here, Sumerian and Akkadian) were only part of the linguistic environment of ancient Iraq. Other languages spoken by the inhabitants were written using other scripts, usually on other media. Occasionally, inscriptions in those languages were written on clay tablets, mostly alongside cuneiform. The earliest examples of this so far are the as yet undeciphered linear inscriptions found on the Sealand dynasty (eighteenth–sixteenth century BCE) texts published by Stephanie Dalley.⁴³ In the Neo-Assyrian and Neo-Babylonian worlds, Aramaic was becoming *lingua franca*. Accordingly, Aramaic increasingly intersected with the cuneiform world. Notes in Aramaic are sometimes found on cuneiform tablets both in Assyria and in Babylonia, and even entire texts can be written in Aramaic on clay objects typical for cuneiform. Those Aramaic inscriptions can be made either by incising into clay or by inking onto the surface. The incised texts are made while the clay is still moist, as evidenced by the displacement of clay around the pen strokes. There were specialist cuneiform scribes and specialist Aramaic scribes,⁴⁴ but it seems likely that cuneiform scribes were also literate in Aramaic. Either could have written the texts, but they would have needed to have done so within a limited period. Examples scratched into dry clay seem to be lacking. The inked texts, by contrast, will have been added after the clay had dried.

³⁸ Colbow 1995, 193.

³⁹ Stiehler-Alegria Delgado 1996, 44.

⁴⁰ Baker and Wunsch 2001, 204.

⁴¹ Ehrenberg 1999, 34.

⁴² Altavilla and Walker 2009, 13, 16, 19.

⁴³ Dalley 2009.

⁴⁴ On these scribes see Radner 2021.

This is the more elegant solution, as the curvilinear forms of Aramaic letters are better suited to ink. This is probably the only case in the cuneiform world of deliberately waiting for a tablet to dry. Rare examples survive of linear inscriptions other than Aramaic on cuneiform tablets.⁴⁵ The same principles apply there too.

6 Secondary marks

Subsequent to writing the main text of an inscription, scribes would feel the need to add non-textual marks for various reasons.⁴⁶ One such reason may have been ticking off items in a list. This is exemplified already in the Early Dynastic Period at Abu Salabikh,⁴⁷ Lagash,⁴⁸ and Nippur⁴⁹ with the simple sign PAP, composed of two crossing wedges.⁵⁰ Likewise in the Old Akkadian Period, PAP was used to mark entries (usually individuals) in lists.⁵¹ Selz suggested that '[i]t seems reasonable to assume that the "ticked off" entries are those for which the connected transaction had not yet been executed at the time the document was compiled'.⁵² Other marks are also present in Early Dynastic texts. Josef Bauer noted the sign DIŠ (a vertical wedge) at various points in text 6, and the sign AŠ (a horizontal wedge) in text 125.⁵³ The sign DIŠ-*tenû* (an oblique wedge) is found in Early Dynastic IIIa Fara text VAT 9132 and Early Dynastic IIIb Nippur texts.⁵⁴

The PAP-phenomenon was noted in Nuzi texts already by Meek.⁵⁵ Walter Sommerfeld notes ten such tablets from Tutub.⁵⁶ He observed that PAP is found in well-written texts with a longer intended use period. The mark can be placed in a free area, in smaller script, often scratched into dried clay.⁵⁷ It is also known from

45 Including Greek (for which see Westenholz 2007) as well as an undeciphered script (Dalley 2009).

46 I leave out of consideration here what Arkhipov 2019 terms 'intra-textual' marks, since these are an integral and often inherent part of the text; they are not relevant to the current topic.

47 Biggs 1974.

48 Selz 1989, 208, 231; also VAT 4426.

49 For instance Westenholz 1975a, nos 25, 38, 138.

50 The phenomenon is discussed in Schrakamp 2010, 346.

51 Interpreted thus already by Gelb 1952, 44.

52 Selz 2011, 277.

53 Bauer 1989–1990, 82.

54 Westenholz 1975a, nos 26, 29, 85.

55 Meek 1935, ix. Deimel 1928, 42 suggested that the purpose of the marks may have been to show entries in need of correction.

56 Sommerfeld 1999, 51.

57 Sommerfeld 1999, 52.

Tell Asmar⁵⁸ and Tello,⁵⁹ where it was sometimes added when the clay had dried. Eva-Maria Huber notes a tablet in which the sign NU (another kind of cross mark, typically used to indicate a negative) seems to act in the same way as PAP;⁶⁰ in this case, apparently marking members of the *tám-li-um* class.⁶¹ Zhi Yang observed that in two tablets from Adab remarks are added to the main text in smaller script: PAP, a-tag, ‘damaged by water’, zi-ga, ‘expenditure’, and diri, ‘excess’.⁶²

PAP survives into the Ur III Period, but its use seems to have been declining then.⁶³ Examples can be found throughout the Ur III Period, dated at different points of the year, and from several centres. Since only a few examples have been cited to date, I offer a longer list here.

- **Umma:** BM 105405 (see Fig. 1); YOS 15 157; BM 110288 with dry writing; BM 106685; BM 106691; Ist Um 251; UM 72-25-003 with many erasures; Museum of the Kibbutz Hazore’a 4/776; BM 106075; Nebraska 45; AOFU Wengler 50; SA 63; Boson, TCS 360.
- **Girsu:** A 1246-1982;⁶⁴ LB 610; BM 16377; NBC 58; GMII 305; GMII 605; BM 28042; BM 13667; FLP 1395 large PAP in blank space; BM 13868.
- **Puzriš-Dagan:** FLP 412; NBC 136.
- **Nippur:** IM 58352; CBS 3379.
- **Irisagrig:** Nisaba 15, 1074.
- **Uncertain provenance:** MH 123/24; IMJ 99.174.0046; A 1119-1982.

⁵⁸ MAD I 86, 106.

⁵⁹ Huber 2022, 176. Further examples were found in recent excavations at Girsu.

⁶⁰ FLP 114; MVN 3, 113. See Huber 2022, 61.

⁶¹ Nies 1920, 50 suggested that nu stood for nu-dib ‘not taken’.

⁶² Yang 1989, 37.

⁶³ Examples are cited by Gelb 1952, 44.

⁶⁴ This tablet concludes with a summary that notes 2 guruš PAP, which totals those marked as such in the text. A 1246-1982 displays other relevant features, including being mostly uninscribed, and being cancelled. Pinches 1908, 125 suggested that PAP meant ‘another’, meaning someone by that name other than the first one you would think of.



Fig. 1: An Ur III list with a PAP-mark; BM 105405; © The Trustees of the British Museum; shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

PAP was occasionally added to the end of legal texts from Early Dynastic and Old Akkadian Nippur: see CBS 6170 (house sale); CBS 6165 (slave sale); NBC 6919 (debt dispute; very large impression). Claus Wilcke suggested a meaning ‘discharged’.⁶⁵ Old Babylonian Mari fish issue ARM 21, 89 seems to have an X-mark at the end, perhaps serving the same purpose. PAP can still be found in the Old Babylonian Period: Isin-Larsa field list AO 8415; round tablet with barley account BM 85278;⁶⁶ Larsa tabular account Ash 1923.341 (OECT 15, 122); Sippar legal text BM 81003; Pīkasī account Erm 15134; Mari inventory ARM 31, 154; Mari list ARM 21, 374; Susa list MDP 18, 133 (marginal PAP; this tablet also contains holes, on which see below). PAP survives even into the Sealand dynasty.⁶⁷ Wilfred Lambert first noted the presence of the PAP sign on Neo-Assyrian and Neo-Babylonian scholarly tablets, interpreting these as marking an error that the scribe couldn’t correct.⁶⁸

Other types of check mark are also found on Old Babylonian and later texts. Wilhelmus Leemans in his publication of the Old Babylonian Lagaba tablets in the Liagre Böhl collection noted the presence of several types of mark, alongside PAP:⁶⁹ oblique lines;⁷⁰ marks that resembled either a ‘deep little pencil-hole’⁷¹ or ‘the sign of a hook’ – a corner wedge.⁷² He made a connection with Ignace Gelb’s discussion of the PAP mark in third millennium texts and Albert Clay’s discussion of marks in Kassite texts (for which see below). He determined that the hooks had been made at the same time as the rest of the text, while the other marks must have been placed at same time as the text or shortly thereafter.⁷³ Susa grain list MDP 18, 162 bears vertical marks against entries. Horizontal check marks are found on Sippar ration list BM 86452, and Mari lists ARM 21, 56 (some single, some double),⁷⁴ ARM 22, 27, ARM 22, 40, ARM 24, 223, ARM 32, M 5092 and ARM 31, 214.⁷⁵ Corner wedges are found on ARM 22, 41, M 7754, ARM 24, 229, ARM 24, 256, FM 4, 24, FM 4, 31 (double wedges; erasures are also present), as well as

⁶⁵ Wilcke 2003, 118, n. 385.

⁶⁶ This tablet is cancelled with a thin diagonal line from top left to bottom right.

⁶⁷ As in Dalley 2009, no. 393

⁶⁸ Lambert 1982, 216. See Fincke 2021, 64 for subsequent references.

⁶⁹ Leemans 1960, 31, no. 87, a barley ration text dated to Samsu-iluna (LB 1831).

⁷⁰ Leemans 1960, 31, no. 87; apparently fingernail impressions.

⁷¹ Leemans 1960, 106, no. 182.

⁷² Leemans 1960, 18, with reference to nos 79, 86, 182; also nos 80–82.

⁷³ Clay 1906, 16.

⁷⁴ This text has two lines squeezed in, and an erased entry; they are plausibly interpreted by Arkhipov 2019, 17 as divergences from the source document on which this tablet would have been based.

⁷⁵ For details and discussion of the Mari material see Arkhipov 2019.

at Chogha Gavaneh.⁷⁶ Dowry ARM 22, 322 contains wedges that vary between horizontal and corner. Use of the mark survives into Ugarit.⁷⁷ Several other features relevant here can be found in the same texts as the check marks: unusual script (for which see Section 13 below); extra text on the left edge;⁷⁸ numbers written in the margins;⁷⁹ gaps in the text;⁸⁰ erasures and corrections.⁸¹

Leemans's 'pencil-holes' continued in use. They appear in late Old Babylonian texts from Dur-abi-eshuh,⁸² Larsa,⁸³ Uruk,⁸⁴ Mari,⁸⁵ Chogha Gavaneh,⁸⁶ then again often in Sealand administrative texts.⁸⁷ Some tablets contain numerous check marks in the same line of text. They are perhaps to be explained by their counterparts in the Kassite administrative texts. At Middle Babylonian Nippur, Clay noted the use of small round or semi-circular holes as check marks, found particularly on the larger tablets (published examples include BE 14, 91a, BE 15, 160, 184, and 200).⁸⁸ The phenomenon is now explored in detail by Jonathan Tenney, in a penetrating analysis that sets the standard for our study of 'administrative reality'.⁸⁹ In brief, he presents a wide and compelling array of evidence that many of the tablets in his corpus must be second or even third order texts, drawing on first order texts that are not preserved in significant quantities. This evidence includes several features of particular relevance to the present paper. He first notes that the columns of some texts were inscribed in an order different from what we would traditionally expect. Secondly, he notes that large blank spaces can be left, awaiting future inscription. Thirdly, some blank spaces include the note *ul ītiq(ū)* indicating that the groups were not inspected. Fourthly, omitted sub-columns can be

⁷⁶ Abdi and Beckman 2007, no. 40.

⁷⁷ Pardee 2002, 13.

⁷⁸ Leemans 1960, 24–26, no. 80.

⁷⁹ Leemans 1960, 60, no. 123; cf. note to no. 87.

⁸⁰ Leemans 1960, 41–42, no. 95.

⁸¹ Leemans 1960, 18–20, no. 76.

⁸² CUNES 51-01-089, -091, -296; 51-03-296. I am grateful to Marine Béranger for alerting me to these texts.

⁸³ YBC 7260.

⁸⁴ BM 22715.

⁸⁵ ARM 24, 221, ARM 24, 222, ARM 24, 224.

⁸⁶ Abdi and Beckman 2007, nos 40, 47.

⁸⁷ Several in Dalley 2009.

⁸⁸ Clay 1906, 16–17.

⁸⁹ As presented at the 69th Rencontre Assyriologique Internationale, Helsinki, July 2024. I'm very grateful to Tenney for sending me a copy of his unpublished manuscript and allowing me to cite from it here (Tenney forthcoming). These check marks are also present in the contemporary tablets published in Van Soldt 2015 and Devecchi 2020.

added later, when the clay was dry. Fifthly, data could be corrected with more up-to-date or improved information. Sixthly, omitted lines could be added later, in smaller script.⁹⁰ There is clear evidence of textual reliance and excerpting. This context allows clearer understanding of the use of check marks. They seem to indicate not so much that a transaction had been completed, but rather that the information to which the mark was attached (sometimes more than one per entry) was checked and correct. Some erasures and corrections are accompanied by a check mark, which means that a correction was made, then likely marked as corrected and/or verified against a new and up-to-date document. Tenney records that most marks were made after the scribe had completed the text. They were nevertheless usually written soon afterwards, since they are deep, which would have required the clay still to be soft; a few were written when the clay had dried. Their presence on top of the written text can make it difficult to read the main text.

A related use of check marks is exemplified through Old Babylonian school texts, where the cross-shaped signs BAD or NU, or a horizontal wedge, indicate an error made by a learner pupil.⁹¹ Scholarly texts continued to display these habits, right down into the Late Babylonian Period, again with simple signs as found in the tablets described above: PAP, NU, single or double vertical, horizontal or corner wedges.⁹² These marks were made while the clay was moist, indicating that the checking process took place soon after inscription, and was probably planned from the outset. Stefan Maul and Sara Manasterska note holes of various shapes in Middle and Neo-Assyrian school tablets, which they interpret as the fruit of interaction between teacher and pupil.⁹³ Shlomo Izre'el observed the presence of marks on scholarly tablets from Tell el-Amarna that he interpreted as possible cancellation marks.⁹⁴ Returning to administration, a similar phenomenon was noted at Old Babylonian Mari, where ink strokes were used to mark entries on tablets recording individual events as they were transferred onto tablets containing summary accounts.⁹⁵ This would have been done after the clay was dry. The individual accounts were retained because they had been sealed and thus served

⁹⁰ This phenomenon is another that should be recorded systematically and studied in more detail. A few examples are cited in this paper. Note also Krebern timer, Marzahn and Selz 2005, 48 who cite an Early Dynastic IIIa example.

⁹¹ Civil 1979, 6–7.

⁹² See in detail Fincke 2021, 61–68.

⁹³ Maul and Manasterska 2023, 32–33.

⁹⁴ Izre'el 1997, *ad* EA 348 and 349.

⁹⁵ Charpin 1984.

as proof. Ink is further attested at Tell Bi'a on the Syrian Euphrates.⁹⁶ Another related phenomenon is the habit of deletion through adding extra strokes with a different stylus. This vertical deletion of numbers was noted at Early Dynastic IIIa Fara.⁹⁷ See also under erasure below.

7 Erasure and re-inscription

An advantage of clay is that mistakes could potentially be rubbed out by smoothing the clay.⁹⁸ The extent of the phenomenon may be exaggerated. This is not to claim that erasure was not in widespread use; that much is easily verifiable. The point is rather that smoothing the clay is not quite as straightforward as often claimed. Firstly, the scribe would need to ensure that adjacent text and rulings were not affected. This would be a particular problem for mistakes noticed only upon checking or later re-reading.⁹⁹ Secondly, cuneiform is usually deeply impressed. In this situation, a significant amount of smoothing is required. Even when previously inscribed matter is not affected, the topography of the tablet would be. And topography seems to have been part of what constituted a properly formed tablet. This is visible in the well-formed appearance of almost all tablets of more than ephemeral nature. The difficulty of erasing deep wedges (especially the heads, of course), can be seen in the presence of outstanding traces under any replacement text or blank space. This is in most cases how we identify erasure in the first place. It might be argued that these are the unsuccessful examples of erasure, since a completely successful instance by definition would not be visible. The widespread nature of the unsuccessful examples, however, suggests that this is not the case. And the very commonality of visible erasures, therefore, indicates the difficulty of executing the practice. Confirmation of this could be offered by examples where mistakes are noted but not corrected, and plausibly some of the examples where uncorrected and unmarked mistakes are noted by modern scholars. We should also consider the likely existence of documents that were discarded, destroyed, or re-made on account of being judged of insufficient quality.¹⁰⁰ The cuneiform corpus is very large. And although the distribution of texts recovered

⁹⁶ Durand and Marti 2004, 132.

⁹⁷ Krebern timer, Marzahn and Selz 2005, 48.

⁹⁸ On this topic see Charpin 1989.

⁹⁹ See Fincke 2021, 59–61 for detailed examples of erasure in Neo-Assyrian scholarly texts.

¹⁰⁰ Delnero 2024, 11–12 offers an example of a tablet that seems to have been abandoned due to the volume of errors and difficulty of correcting them adequately.

across time and geography is not even, we can accept it as reasonably representative of practice in this regard. It should therefore be possible to quantify erasure in various ways. Paul Delnero has exploited the difficulty of erasure and the visibility of attempts to do it in both school texts and cultic texts to study errors and variation.¹⁰¹

We can probably dismiss the possibility that, outside of schooling contexts, it was standard practice to erase and reinscribe entire tablets, although examples of extensive erasure are known:

- Buffalo BSNS C 5182: an Ur III tablet from Umma with obverse erased (leaving traces of the depth of wedges), but the reverse not.
- X.3.124 (Michael C. Carlos Museum): an Old Babylonian school practice tablet whose text is almost completely erased, with limited success.
- BM 103740: an erased Babylonian scholarly extract tablet, blank except for scattered traces on the obverse and reverse, and ends of six lines on the right edge.
- BM 77928: a Late Babylonian tablet on which an attempt seems to have been made to erase the entire text, with limited success.
- K 3162: a Neo-Babylonian letter with text erased on the reverse.
- BM unregistered fragment: a portrait format tablet that has been almost entirely erased.

Sometimes erasure of sections can be found, as in Old Akkadian administrative tablet from Adab CUNES 49-07-016. Erasures can be made during or after the period of inscription, thus while the clay was moist (e.g. Neo-Assyrian extispicy query K 3791), or when it was dry (e.g. silver account)¹⁰². Erasure when dry is impossible to conceal, and is uncommon. It is useful in showing us how much clay must be displaced in order to erase text, and therefore how much distortion of the tablet surface the process entails. Erasure while damp can also leave significant traces. Examples of conspicuously deep erasures are offered by K 9572, a *Shumma Alu* excerpt (see Fig. 2); BM 26187, a Late Babylonian hymn; K 120b, a copy of a dedicatory inscription to Marduk in Esagil (RINAP 5/2, Asb. 224).

¹⁰¹ Delnero 2024.

¹⁰² Westenholz 1975b, 52.

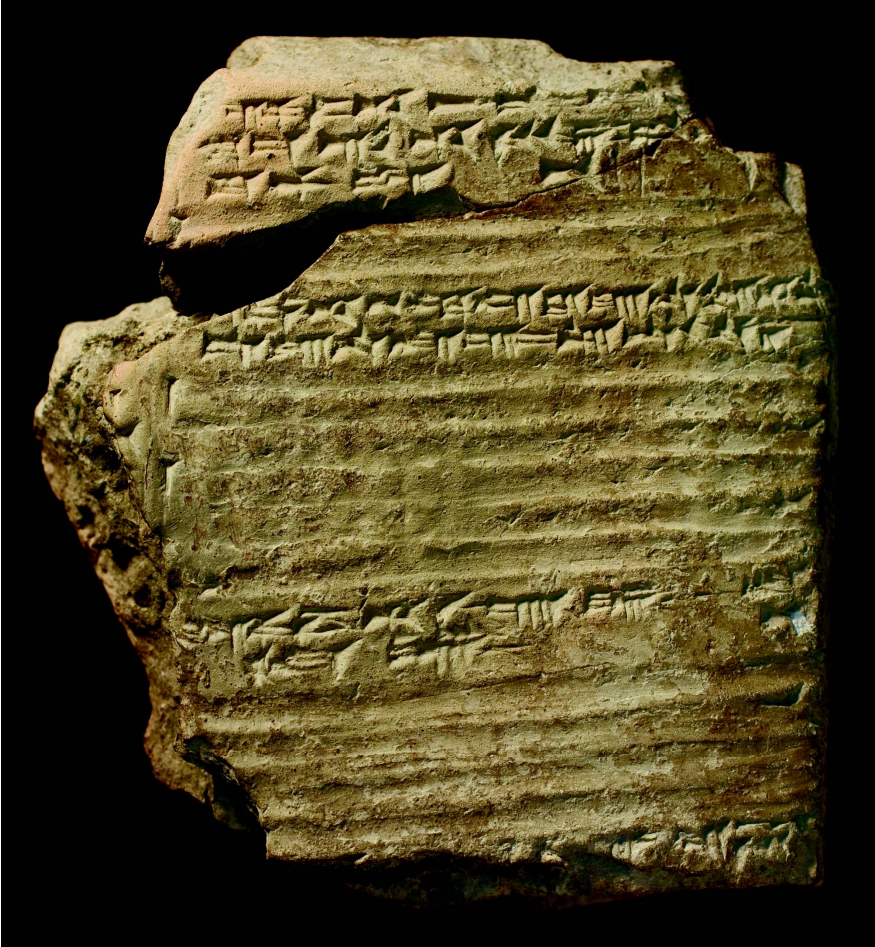


Fig. 2: A Neo-Assyrian excerpt tablet with extensive erasures; K 9572; © The Trustees of the British Museum; shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

Christine Proust and Xiaoli Ouyang detail marginal notations (with a focus on the sexagesimal place value system) in Ur III administrative texts.¹⁰³ They explained the examples using positional notations as intermediate calculations made during transfer between a tablet and an accounting device. The ephemeral figures would

¹⁰³ Proust and Ouyang 2022.

be erased, then that area of the tablet re-used for a new set of figures, with the result that only the latest set remained. They comment that '[t]he marginal numbers seem to have been written and erased several times throughout the process of writing on the tablet and possibly after drying', affirming Marvin Powell's hypothesis that 'marginal numbers often seem to have been noted on dried and then re-moistened clay. The appearance of the tablet suggests that it was moistened and smoothed off after use'.¹⁰⁴ This poses an interesting problem: if the notations are intermediate calculations as proposed, then in the examples where they are written on dry clay, the corresponding entries in the main text should also show signs of being written on dry clay; but this seems not to be the case. The marginal notations are perhaps rather written more shallowly, possibly to facilitate erasure. The marginal notations are interesting here in that they offer evidence for the wider process (and longer time period) of tablet compilation, and provide further evidence of the visibility of erasures. Such erasures can be seen quite frequently on Ur III tablets. Girsu text HSM 6388 provides valuable evidence for how the features might be interpreted. It notes explicitly how the entry was taken from a writing board. That tablet contains significant areas of blank space, with scratch notes on the obverse, and erasures on the reverse. BM 19165 is an Ur III administrative text with rough calculations written in the blank space at the end of the tablet when the clay was already drying. The text also contains PAP-marks (for which see Section 6 above), so the tablet can be understood as relying on source tablets. We might interpret the rough calculations in this instance as intended for transfer to a subsequent tablet. This would explain why it was only the calculations that were written on drying clay.

Yang reported a similar practice at Old Akkadian Adab. Five tablets there contain 'cuneiform' numbers in subscripts underneath the 'round' numbers expressing the amounts received.¹⁰⁵ These secondary numbers seem to have been written after the clay had started to dry, and were interpreted as indicating arrears. Rough calculations are also visible on the reverse of Old Babylonian silver account BM 115735 and Mari field list ARM 21, 428, suggesting similar processes.

¹⁰⁴ Powell 1976, 421. Powell continues by suggesting that this explains why there is so little trace of sexagesimal notation in the Ur III Period: 'Calculations in sexagesimal notation were made on temporary tablets which were then moistened and erased for reuse after the calculation had been transferred to an archival document in standard notation'. While temporary tablets cannot be discounted in principle, the proposition that they were remoistened and reinscribed seems unlikely, and we would expect to have found at least some examples. Snell 1982, 70 makes a similar argument for the widespread disposal of silver account texts in the Ur III Period, referring to Thorkild Jacobsen's earlier observations on the findspots of tablet groups.

¹⁰⁵ Yang 1989, 37. See further Selz 1999, 496.

Likewise X.3.098 (Michael C. Carlos Museum) is an Old Babylonian administrative tablet showing the clustering of crude erasures, scratch notes, and text written on drier clay. It is remarkable that rough calculations were not relegated to a separate scratchpad. The fact that they are present on tablets constituting the bureaucratic record suggests limits to the importance placed on the aesthetics of official documentation and/or limits to the practicality of using a second tablet for calculations. The rough calculations and visible erasures stand in contrast to the general appearance of the tablets, which are usually carefully made and carefully inscribed. We might even speculate that visible calculations offered a degree of reassurance to the reader. Among the Amarna texts, Izre'el suggests that EA 345, 346, 349, and 375 were erased with water for cancelling, while 375 was clearly disposed of while still wet.¹⁰⁶ Lexical lists include references to the effacement of a tablet (as well as, apparently, adding a slip to one).¹⁰⁷

A bridge between erasure and cancellation (see Section 7 below) is provided by secondary marking of documents. Marzahn coined the term '*Tilgungsausbruch*' ('excision of acquittance') with reference to a practice observed in Early Dynastic Lagash.¹⁰⁸ There excisions could be used to mark amounts paid back. This was done an extended period after inscription, and thus when the clay had dried. The tablets were not re-moistened for this. Bauer mentioned that almost all of the Old Akkadian tablets published in CT 50 show such erasure of numbers recording loan amounts.¹⁰⁹ The original amounts are in most cases rendered illegible, although surviving numbers suggest that the level of the loan varies widely. An echo of this may be seen in Old Assyrian list Kt 73/k 14, where the vertical wedges introducing someone's name are overwritten with round impressions.¹¹⁰ Marzahn discusses 'correction' of numbers in Early Dynastic IIIb texts, and its implications for our understanding of bureaucratic procedures.¹¹¹

¹⁰⁶ Izre'el 1997, *ad* EA 345.

¹⁰⁷ See CAD, vol. 15, s.v. '*sêru* 2c'. Cf. CAD, vol. 12, s.v. '*pasâsu* 2b' to obliterate an inscription on stone, 2d to annul a legal text.

¹⁰⁸ See the introductions to VS 25 and VS 27; further Selz 1999, 496–497; Selz 2011.

¹⁰⁹ Bauer 1975, 192–193.

¹¹⁰ Özgüç 1986, plate 61/3a–3b.

¹¹¹ Marzahn 2020.

8 Palimpsests

As a material, clay is capable of being reused for a second inscription once a tablet had lost its function. A type example of this can be cited in the form of Old Babylonian school tablets, where a model text is copied repeatedly by a learner. The right-hand side of the tablet could be erased to make space for another set of attempts at copying. This is a special context, however, which does not simply transfer to wider scribal practice. Erasure and re-inscription here seem to have taken place while the clay was still moist. A slightly different kind of erasure and re-inscription is recorded for Neo-Assyrian school tablets, where the entire surface of a small exercise tablet was affected.¹¹² Again, the educational context is key, and reuse of a still-moist tablet can be assumed. Outside of this, palimpsests proper have been claimed for some Old Babylonian letters from Šušarra (modern Shemshara).¹¹³ No other examples are known to me, and it seems not to be a widespread practice. Indeed, the practice is not to be expected in cuneiform culture. The erasure would have to remove a lot of clay, pushing the tablet beyond the range of norms for size and shape.¹¹⁴ It would need at minimum to be re-moistened first to prevent this. In practice, it would be simpler to reform the tablet. The simplest solution of all would be to take a fresh piece of clay; supplies were not functionally limited. This distinction between reuse of a tablet and reuse of the clay to form a new tablet ('recycling') is an important one. An interesting footnote here is the occasional presence of second texts on tablets, deriving from incidental contact. That is, completed documents had been carried or stored together while still moist, and in the process shared the impressions from their surface.¹¹⁵

9 Document cancellation

Once a document's intended life had been exhausted, it could be disposed of in one of several ways. Recycling was an option, although its extent is probably greatly exaggerated in the modern literature.¹¹⁶ Simple disposal was common. This

¹¹² Maul and Manasterska 2023, 30.

¹¹³ Larsen 1987, 220, n. 51.

¹¹⁴ See further the excursus on secondary layering under Section 10 below.

¹¹⁵ Examples are offered by Altavilla and Walker 2009, 20.

¹¹⁶ On this see Taylor and Cartwright 2011.

is attested both archaeologically and textually.¹¹⁷ A newly deciphered school tablet from Late Babylonian Ur contains a colophon stating how the scribe should dispose of the tablet by crumbling it into a container.¹¹⁸ An alternative to disposal was to incise a line or a cross through the document. This had the advantage that the tablet owner could retain the record (and still read it), while having deactivated its content so that, for example, a loan document could not be presented again to claim a second payment to which the possessor was not entitled. Such crossed out documents are attested from different sites, at various periods, and in a range of genres. They seem to be especially prevalent in Old Akkadian administration. A particularly interesting feature of document cancellation is that while some examples are clearly cancelled long after the tablet had dried, in many examples the cancellation happens at the point of inscription, while the clay is still damp. These surely represent a different branch of practice. It seems reasonable to assume that the administration required a chain of documents to record the flow of commodities. The tablets cancelled essentially at the point of inscription suggest that these documents are retrospective, and designed to close a backlog. The tablets cancelled when dry suggest an altogether different thing.

9.1 Old Akkadian

Girsu

- BM 86282: labour. Vertical line down each column on obverse and reverse. See Fig. 3.
- BM 86289: labour. Two vertical lines down obverse and (blank!) reverse.
- BM 100476: animals. Cross through obverse; reverse blank.
- L 4667: land. Rough verticals down each column; multiple in i.
- L 4763: land. Cross through obverse and reverse.
- L 5883: food. Diagonal from top left to bottom right on obverse, bottom left to top right on reverse.
- L 5889: land. Cross through column i, but not ii–iv.
- WML 56.22.262: animals. Cross through obverse and reverse.

¹¹⁷ For which see e.g. CAD, vol. 6, s.v. *‘hepû’*; Oppenheim 1948, 132–133.

¹¹⁸ <<https://www.ebl.lmu.de/fragmentarium/U.3018>> (accessed on 7 October 2024).

Umma

- Land texts with a vertical down the obverse and reverse: BM 123075; JRL 9; JRL 12; JRL 27; Cripps 2010, nos 1, 2, 5, 12.
- ‘Beer and bread’ texts with a vertical down the obverse and reverse: BM 123069; BM 123083; BM 123096; NWHCM 2000.102.2; Foster 2019,¹¹⁹ nos 1–2, 4–6, 8–13, 19–20, 28–29; Cripps 2010, nos 16–27,¹²⁰ 33; IM 5592/4b, IM 5592/7; Foster 1982, nos 30–32, 35, 38.
- ‘Beer and bread’ texts with a vertical down the obverse and a more diagonal line on the reverse: BM 123068; BM 123070; BM 123071; BM 123080.
- Labour texts with a vertical down the obverse and reverse: Foster 1982, nos 44–45, 47, 49; BM 140668.
- Foster 1982, no. 58: animal text with a vertical down the obverse and reverse.
- MS 4259: oblique strokes cancel several entries.

Benjamin Foster observed that nearly all the bread and beer texts seem to be cancelled with a single line on each face, usually when the tablet was still moist.¹²¹ He suggested they ‘may indicate deductions of the totals from an inventory’. He highlighted that JRL 27, a document summarising land parcels, is cancelled only on columns i, iii, and v (but not ii, iv, or vi) and is apparently unfinished.¹²² In some examples it can be seen that individual lines were cancelled, as well as the tablet as a whole. Ingo Schrakamp observed that the horizontal lines were made prior to the vertical lines.¹²³ This is what we would expect when the scribe was ticking off each item on the list, then marking the whole document complete. Given that the crossings were made while the tablet was still damp, this would suggest a very short life for the document. Schrakamp suggested that the tablet could be kept suitable for inscription with a damp cloth until the ticking off of all entries could be achieved (on which see further Section 12 below).¹²⁴

¹¹⁹ Foster 2019, 9 comments that the practice of cancellation with a single vertical line is characteristic of Classical Sargonic administrative tablets from Umma.

¹²⁰ No. 22 reverse looks almost diagonal; no. 23 reverse seems to be uncanceled.

¹²¹ Foster 1982, 115.

¹²² Foster 1982, 89.

¹²³ Schrakamp 2012, 146, *ad* Cripps 2010, nos 1, 2.

¹²⁴ Schrakamp 2012, 146.



Fig. 3: An Old Akkadian tablet with cancellation lines; BM 86282; © The Trustees of the British Museum; shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

9.2 Lagash II

- BM 86280: cross through obverse and reverse.
- SM 1906.2.8: equids. Cross through obverse and reverse, when the clay had dried.

9.3 Ur III

Girsu

- BM 101984: grain account. Three verticals down obverse and reverse, with a subsequent comment on reverse.
- BM 22864: beer account. Vertical line down obverse and reverse.
- A 1246-1982: labour. Two vertical lines down each column.

9.4 Old Babylonian

Sippar (cross through obverse and reverse)

- BM 80161: loan.
- BM 81398: loan.
- BM 80313: slave sale.
- BM 80768: receipt.

Dur abi-eshuh (cross through obverse and reverse)

- CUSAS 8, nos 7, 13, 46: loans.

Babylon

- Robert Koldewey mentioned finding Old Babylonian documents in foundations, some of which had been crossed out.¹²⁵

Larsa (cross through obverse and reverse)

- AO 8495: loan.
- YBC 4743: shepherding account.

Kish (cross through obverse and reverse)

- MLC 1652: loan.

Pi-kasi (cross mark after the end)

- AO 9074: letter.

Ur (vertical line down obverse and reverse)

- YBC 4801: note about animals.
- YBC 4802: note about animals.

Uncertain provenance

- BM 85278: round barley account with check marks. Thin diagonal line from top left to bottom right.
- AO 8376: letter. Cross mark after end.

Many of the Old Akkadian documents are marked with only a single, faint line across the face of the document. It sufficed to accomplish the act of cancellation, even though it is often quite difficult to see. This opens the question as to whether

¹²⁵ Koldewey 1914, 246.

the double line cross was a purely practical measure or influenced to some extent by the negative implications of crossing lines, as in cuneiform characters NU and PAP (for which see Section 6 above). This remains speculation. The cancellation lines are often single, and while many are vertical, others are not, and the lines do not even need to be straight. Giuseppe Visicato interpreted the crossing as indicating ‘that the tablet, rejected by the controller of the tablets (agrig), had to be re-written because of mistakes or that it was a preliminary record’.¹²⁶

It should be noted that crossings are rare in cuneiform. They were not a standard part of the administrative process; or at least, if they were, few traces of it survive and there is little to distinguish the affected tablets from the many others that survive alongside them. It is also the case that many mechanisms for the disposal or destruction of unwanted tablets existed. The crossed tablets have not been subjected to them. They are found alongside the uncrossed tablets. It therefore seems probable that crossed tablets were deliberately retained for a period of time, either until they could be redrafted, or (more likely, in my opinion), until the end of their accounting period. Set against the general scarcity of crossing, its ubiquity among tablet groups such as the ‘beer and bread’ texts from Old Akkadian Umma invites us to ponder why some examples exist there without the crossing. Are the uncrossed documents evidence of incomplete operations?

Crossing was also done to block space.¹²⁷ Most examples are magic texts, although a letter is also attested. This type of crossing is not pertinent to the present discussion. A further practice related to cancellation but not pertinent to the present discussion is the breaking of the upper left corner of Early Dynastic administrative texts, interpreted as meaning that the tablet was of no further use for planning and distribution, or taken out of circulation.¹²⁸ A different kind of cancellation by way of secondary marks (on which see further Section 6 above) is found on Middle and Neo-Assyrian administrative tablets. Maul and Manasterska observed that holes were commonly made on such tablets to indicate the permanent end of the relevant transaction.¹²⁹

¹²⁶ Visicato 2010, 440, n. 31; echoed in Maiocchi and Visicato 2020, *ad* 312.

¹²⁷ See Reiner 1960, 151.

¹²⁸ See Selz 1999, 496; Selz 2011, 278.

¹²⁹ Maul and Manasterska 2023, 33, n. 145.

10 Enveloping

A practice attested through most of cuneiform is enveloping. Mesopotamian tradition held that enveloping was invented in a failed ruse to try and have the future king Sargon murdered. The earliest attested envelope is indeed Old Akkadian. But the main purpose seems to have been to protect the original from accidental damage or deliberate tampering rather than concealing content. Typically, the text of the document inside was copied on the envelope, oriented at 180 degrees to the text of the tablet. There is discussion in the literature as to how an envelope could be applied to a tablet without them sticking together. Waiting for the tablet to dry out would not be effective, since the clay would shrink as it dried, and thus the envelope would crack around the tablet. Clay cited an example from the Middle Babylonian Period where the text of the envelope is dated one day later than that of the tablet within (CBS 3331);¹³⁰ similar cases are sporadically noted among Old Babylonian texts.¹³¹ It remains to be demonstrated whether this is a reflection of a real temporal difference or whether it is simply a mistake.

A brief excursus on secondary layers of clay is pertinent here. This practice is attested in Old Babylonian school contexts. On the ‘type II’ tablets, where a learner copied several times a model provided by a more advanced scribe, the copy area would be erased and re-inscribed with further efforts. These tablets were unusually thick, presumably to accommodate this practice, but even they could become too thin. This provoked two responses. One was to cut away the copy area, preserving the model for further use. The other was to add supplementary clay to the thinning copy area.¹³² Since wet clay will not adhere well to dry clay, this would need to have been done within a limited time from the tablet’s production, and it could not have been a viable practice outside the school context.

11 Firing of tablets

Another area of Assyriology where further clarification is necessary is the question of tablet drying/firing. This is a complicated question.¹³³ The consequence of firing is that the clay would no longer be recyclable or re-moistenable. On present

¹³⁰ Clay 1906, 10.

¹³¹ For instance Leemans 1960, 49.

¹³² For an example see here Oelsner and Veldhuis 1997.

¹³³ See in detail Reade 2017.

evidence it seems that deliberate heating of tablets was unusual, especially outside of library contexts.

A much-discussed phenomenon in cuneiform is the presence of so-called ‘firing holes’ in some scholarly tablets. They are relevant here in that they were added after the text was inscribed, and this must have been done before the clay had dried. They can be found on lengthy texts, sometimes in large numbers, and are frequently very deep. George Reisner recorded the presence in Late Babylonian scholarly texts of what he thought were small round ‘cancellation marks’, indicating text due for erasure; these are ‘firing holes’, the function of which has not yet been demonstrated, but is not apparently related to error correction.¹³⁴

12 Textile impressions

Occasionally, textile impressions can be seen on the surface of clay tablets (see Fig. 4). Most are deliberate, but a few are incidental. Some of these may represent traces of a dampening cloth to retain moisture in a tablet. Clay posited use of a damp cloth, based on apparent textile impressions on the surface of tablets.¹³⁵ Aage Westenholz made similar claims.¹³⁶ Nicholas Postgate recorded textile impressions on Middle Assyrian tablets, a couple of which seem to be seal substitutes, while others may be incidental.¹³⁷ Maul and Manasterska note that textile impressions can be seen on many Neo-Assyrian school tablets.¹³⁸ A similar situation was cited by Petra Gesche for Late Babylonian tablets.¹³⁹ It is currently difficult to confirm such claims of dampening cloths rather than other incidental impressions, or even non-textile impressions. Ideally, we would first check that a weave pattern is present; crossing fingerprint impressions can appear to the naked eye to be textile impressions. Some examples of each will be provided by Nicole Reifarh, Caroline Cartwright, and the present author in a forthcoming article. Secondly, we would benefit from a significant corpus of examples, to allow us to identify the features left by the practice, and distinguish them from other impressions.

¹³⁴ Reisner 1896, xiv–xv.

¹³⁵ Clay 1906.

¹³⁶ Westenholz 1975a.

¹³⁷ Postgate 1988, nos 2 and 54, and 13, 28 and 53. See also MARV 10, 27.

¹³⁸ Maul and Manasterska 2023, 29.

¹³⁹ Gesche 2001, 41.



Fig. 4: A Middle Babylonian tablet with textile impressions. Reverse and zoomed view. BM 13253.
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13 Writing on dry clay

The limited inscriptional window offered by clay can be seen in instances from across the cuneiform corpus of tablets containing text that was written whilst the clay was much drier than normal. The technique of impression is the same, but the results have a distinctive appearance, being shallower than normal.

13.1 ED IIIb

- CUNES 48-06-246 (Adab). Date added when very dry.
- TM 75 G 1541 (Ebla) is an uncompleted document about the expenditure of gold. While the obverse and the first half of the reverse are written as normal, the last two and a half columns of the reverse are lightly ‘incised’.

13.2 Old Akkadian

Tutub

- Tutub 29: reverse written on dry clay.
- Tutub 34: the last few lines of the main text, but apparently not the following total, are written on dry clay.

Girsu

- ITT 2 5770: reverse written on dry clay.
- BM 86282: two entries, one of which (obv. ii 10) was squeezed in using very small script. Some of the numbers are cancelled by overwriting with wedges.
- BM 134931: the last entries in the main text, spanning the end of the obverse and the start of the reverse, were written on dry clay. The summary section was written on moist clay. Erasures are also present. See Fig. 5.

Umma

- BM 140668: the last five entries of the main text were written on dry clay, but not the following summary section.

Adab

- MS 2724/13. Reverse on dry clay.
- A 878. Total on the reverse written on dry clay; the date was added even later, on very dry clay.

Nuzi

- HSS 10, 5: note on left edge on dry clay.
- HSS 10, 70: date at the end on dry clay.
- HSS 10, 71: summary at end on dry clay.
- HSS 10, 107: summary at end on dry clay.
- HSS 10, 142: almost entirely on dry clay.
- HSS 10, 180: almost entirely on dry clay.
- HSS 10, 187: single entry on dry clay.

Umm el-Hafriyat

- CUNES 50-03-114: last entry in section on dry clay.



Fig. 5: An Old Akkadian tablet with dry writing, obverse and reverse; BM 134931; © The Trustees of the British Museum; shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

An especially intriguing example is provided by the royal inscriptions of Lu-Utu of Umma. His text RIME2.11.6.2 is preserved on three cones. Its structure is ‘For DN, Lu-Utu, governor of Umma, did X’. On both BM 109930 and BM 109931, following the gubernatorial title comes a line asserting that he is *dumu* ^d*nin-in-sin-ka-ke* ‘son of Ninisina’; and on both cases it was added after the clay had dried. It is probably no coincidence that the line in question is omitted by the only other source, YBC 2148. This raises questions as to the process of producing the cones. We would have expected that the text would have been discussed and agreed in advance of starting manufacture. A different situation would be evidenced by UM 42-20-248, a cone of Puzur-Inshushinak from Susa, where the final line of texts seems to have been added later alongside the main column of text.

13.3 Lagash II

- AO 3353: total written on drying clay, but not the following text.
- BM 15414: last lines on the reverse on dry clay.

13.4 Ur III

Many examples are known of Ur III tablets bearing text added when the clay was dry.

Girsu

- BM 12923: flour. The end of the first column of the reverse, and the second column, were written on dry clay. Several extra entries have been squeezed in using small script at various points in the text.
- BM 13086: labour. Last lines on reverse on dry clay.
- BM 13141: labour. Last lines of main text on dry clay, before the text ends apparently prematurely; the summary line at the end was written in still moist clay.
- BM 15300: the last entry before the subtotals on dry clay.
- BM 15426: grain. Total on dry clay, after erased scratch pad.
- BM 19168: first lines of the reverse are on dry clay; all other text is on moist clay.
- BM 19719: dry text at various points throughout, in spaces left for them, but also obv. i in a series of lines.
- BM 23687: bitumen. The second column on the reverse, including the total, on dry clay.

- BM 28009: wool. The end of the first column of the reverse on dry clay, but not the second column.
- CFC 126: last line of the main text on dry clay, but not the following date.
- ICP 1248: total on left edge on dry clay.
- ISACM A 31693: grain. The summary section on dry clay, but not the following date.
- LB 41: animals. The last two entries on the obverse on dry clay, but not the entry on the reverse or the summary or the date.
- MVN 10 196 C: the date on the left edge on dry clay.
- BM 21436: animals. An apparently unfinished document, leaving spaces for numbers. The last couple of lines are written on drying clay.

Umma

- A 1116-1982: labour. Text added after the date on dry clay, appearing in a section containing erasures.
- A 1648-1982: text on the reverse on dry clay.
- BM 110288: several entries throughout text on dry clay. Erasures are also present
- BM 96943: barley. Last entry on dry clay, but not the summary.
- Bod S 411: last line on dry clay, forming the summary section.
- DUROM U 10771: last line on dry clay.
- MS 1908: labour. Several entries throughout the text are written on drying clay, as well as most of the final inscribed column of the main text (rev. vi). In rev. viii comes a summary, most of which was written on still moist clay, as was the following date. Several entries were squeezed in using small script. There are several areas with erased calculations.
- NBC 3154: animals. The summary line on dry clay.
- NBC 4223: food. Entries on the reverse on dry clay.
- NBC 580: tag for tablet basket. Summary line on dry clay, but not the following date.
- RC 927: date on left edge on dry clay; this is a repeat of a date already present there.
- SA 147: place name on left edge on dry clay.
- SIL 96: summary on dry clay.
- YRBC 232: messenger text. Summary on dry clay.
- AO 6162: end of total on dry clay, but not the following summary. Secondary addition in blank space. Erasures appear in the text. Line squeezed in.

Ur

- UM 47-29-359: indented notes on the reverse on dry clay.
- UM 47-29-388: the summary section is written on drying clay, that area apparently having been erased (the surface is significantly below the upper part of the reverse).

Irisagrig

- Nisaba 15, 212: messenger text. Date on left edge on dry clay.
- Nisaba 15, 298: animals. Entry part way through reverse on dry clay.
- Nisaba 15, 560: messenger text. Entry part way through reverse on dry clay.
- Nisaba 15, 561: messenger text. Summary on left edge on dry clay.
- Nisaba 15, 877: account. Last entry on reverse on dry clay. Erasures and blank spaces are also present.

Drehem¹⁴⁰

- AUCT 2, 54: animals. Summary section on re-moistened clay, but not the following date. Erasures also present.
- Bod A 60: animals. Summary on left edge on dry clay.
- HS 2259: animals. First three lines of obverse on dry clay, over erasure.
- SM 1911.10.114: animals. One entry on obverse and reverse on dry clay. Erasures also present.
- SA 2: animals. Identification of one of the officials on dry clay.
- SE 142: woods. Summary on left edge on dry clay.

Uncertain

- NMSA 3914: animals. Year on dry clay, but not the total on the left edge.
- MS 1716/1: totals on dry clay, but not the following date. Erasures also present.
- ICP 1253: messenger text. Last entries on dry clay, but not the following date.

A special case where secondary inscription is often visible is that of the round tablets bearing Ur III field surveys from Girsu.¹⁴¹ The content that is dry-written is consistently one thing only—the yields (whether calculated or counted) for the plots measured (e.g. BM 12389, BM 12390, BM 12419, BM 12433, BM 12436, BM 12617, BM 12911, BM 26995, BM 21350). This explains quite naturally why the dry-written content was entered only later. Examples are also found where the parts of the

¹⁴⁰ Tsouparopoulou 2015, 56 comments that dry writing is usually evident on larger and longer tablets.

¹⁴¹ See already Maekawa 1982, 101.

tablet that would contain the results are blank (e.g. BM 18039, BM 18040, BM 18042, BM 18046–18050, BM 18052–18057); these could perhaps have been entered in ink that no longer survives, or perhaps were never written at all, since the clay had hardened.

13.5 Old Babylonian

Larsa

- BM 113284: contract. Text added near the end on dry clay.

Lagaba

- LB 1934: barley rations. Date added later on dry clay. This text also bears check marks.
- LB 1935: barley rations. Date added later on dry clay.
- LB 1824: reed account. The name of the key individual was written in drying clay over an erasure.
- Leemans cited LB 1971 (a scratchpad) as containing text on dry clay, but this is unclear on the available photo.¹⁴²

Mari

- ARM 22, 322: list. Day added later on the left edge on dry clay, subsequent to the month name, which was written on still moist clay.

13.6 Neo-Assyrian

There are instances of routine writing on dry clay. This is the case for Ashurbanipal Library colophon *a*. In most cases, it is written in this fashion; monumental sign forms are also used in these examples. This colophon was clearly added secondarily. In another group of tablets, the phenomenon was occasional rather than routine. In the extispicy reports there are examples of dates added to texts secondarily, e.g. extispicy queries K 8904, K 4696, K 1611 (also some observations added secondarily). The same phenomenon is found also in letter K 78. K 385 is an extispicy query with some erasure on the obverse and much on the reverse; a subscript was then written on the reverse in smaller script on drier clay. Fincke

¹⁴² Leemans 1960, 35.

commented that corrections and ad hoc glosses were often made on dry clay.¹⁴³ A good example of the co-occurrence of erasure and insertion of new text on dry clay is celestial divination fragment K 12389.

13.7 Late Babylonian

Alongside isolated examples such as BM 130244, where an edge inscription was added on dry clay, mention must be made of a special group of tablets – the Late Babylonian astronomical records. An ongoing series of daily observations were made of the Euphrates and features in the sky. They were made first on ‘preliminary’ tablets (or waxed writing boards)¹⁴⁴ recording a few days’ worth of observations, then transferred to ‘short diaries’, and from there to summary records (‘standard diaries’) documenting longer periods of time. The standard diary for -384 (i.e. 385 BCE) contains two significant comments.¹⁴⁵ One states that *APIN u GAN NU ba-ár* ‘months viii and ix are unchecked’, and the sources therefore apparently unavailable. The other states that *AB u ZÍZ ina ^{gis}DA NU SAR.MEŠ* ‘months x and xi are not written on the (waxed) writing board’, indicating that it must have been compiled from such originals. Abraham Sachs and Hermann Hunger suggested that damp cloths could have been used to maintain the drying window of clay in the preliminary records over a few nights;¹⁴⁶ alternatively, a wax tablet could have been used instead. This was not always successful, as shown by their last lines being written on dry clay, before no further attempt was made to inscribe the tablet:

- BM 33808 (-201C month xii days 1–3): dry text from day 3, part way through the line after data from day 2. See Fig. 6.
- BM 33992 (-198A month i days 19–24): dry midway through data for day 24
- BM 36807 (-200A month xi days 1–14): dry text from day 13; also extra information on the left edge about day 9.
- BM 32597 (-198B month iv days 1–15): dry from day 14.
- BM 55539 (-190A month i days 1–16): dry from late on day 14.
- BM 45926 (-180B month x days 3(?)–25): dry from day 24.
- BM 40096 (-191B month viii days 2–25): dry from day 23.

¹⁴³ Fincke 2021, 68–69.

¹⁴⁴ Pirngruber 2017 publishes a remarkable administrative tablet from the early sixth century BCE that states it was copied from a parchment original; wider use of this perishable material can thus be assumed, even from this early date.

¹⁴⁵ See Mitsuma 2015, 55–56.

¹⁴⁶ Sachs and Hunger 1988, 12.

- BM 32164 (-178A month v day 1–vi day 1): month v and the river level section were written on moist clay; month vi was also set up, but the actual data is written on dry clay.



Fig. 6: A Late Babylonian astronomical diary with dry writing; BM 33808; © The Trustees of the British Museum; shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

These tablets also display small blank spaces in the area for sky reports before continuing with river levels. The wedges of the river level text are as deep as the early sky report text (except BM 40096), while the last day or two of the sky report text can be shallow, having been written on dry clay. This clearly indicates that

the lines of text were inscribed in an order different from that in which they appear on the tablet's surface. The amount of space left would suffice for maybe a few days, but not longer. The primary records extend over a period of less than a month. The range is not fixed, so we are not witnessing a straightforward measure of how long clay stays moist. While we might argue from some that the window of opportunity was as long as 20 days or more, other examples imply a window of only a couple of days. In each case, the dry text extends over the last 1–3 days, regardless of how long the record covers. And the duration seems not to correlate with the time of year in which it was written. The longer periods fall during the winter months, but there are not enough samples to allow reliable conclusions to be drawn. From this, we are entitled to infer that the scribes took measures to extend the window of opportunity. We might also infer that they ceased to do so a couple of days before the observations scheduled to be recorded on the tablet were complete.

13.8 Analysis

Several observations warrant making here. Examples of writing on dry clay can be found across the cuneiform corpus, covering a wide range of times and places, as well as types of text. They can be found both on tablets intended to have limited lives and on those intended to have longer lives. A remarkable feature of the dry-writing phenomenon is the tablet types on which this style of writing is found. Clay tablets come in a vast range of sizes, from just a couple of centimetres to more than 30 cm. Examples of dry-writing occur almost exclusively on smaller tablets with limited text, which could comfortably have been inscribed completely within a short period of time. Were dry-writing a purely logistical matter, caused by the sheer length of time taken to write long texts, we would expect to find it exclusively on larger tablets. There must be something about the process of writing the shorter texts that determines the scribal habits. The same can be said about scholarly texts. Some of the larger library tablets contain hundreds of lines, and must have taken a significant period of time to complete. The tablets of the *Nineveh Medical Encyclopaedia*, for example, routinely contain 250–300 lines each, and are among the largest tablets ever produced. Yet dry-writing is absent.

Ur III tablets represent a significant proportion of the above sample. While the Ur III corpus is the largest in cuneiform, the frequency is still striking. We can assume, at least until a sufficient body of evidence to the contrary may be found, that this reflects something about the way in which Ur III bureaucracy functioned. A benefit of the prevalence of examples from the Ur III Period is that so many are dated. This could eventually help us understand whether environmental condi-

tions might be influencing the phenomenon. The months found on the tablets cover a wide range. Among the examples listed here, four are dated in month i (March/April), four in month v, one in month vi, two in month ix, one in month x, two in month xi, and three in month xii. The sample size is still small, and no clear correlation with environment is visible. The phenomenon appears to be better explained via other features.

A further noteworthy feature is the co-occurrence of erasures with dry writing. Many examples cited above also display the traces of erasure, blank space, and/or additions in smaller text. The explanation for this can be found in consideration of the practical implementation of writing, especially the temporal aspects locked into the tablets. Piotr Steinkeller, with reference to the Ur III Period, proposed that tablets were written sometime after the events they record.¹⁴⁷ The scribes would thus keep ephemeral notes before subsequently writing them up at leisure. We might wonder why so few ephemeral notes are known: were they not often made, have they not survived, or have we not recognised them for what they are? The features documented above show that the process of writing a tablet was about much more than inscribing a pre-decided text. Put another way, a scribe could start writing a tablet without knowing what he was going to write. What was known, however, was the structure. Space was left for the content to be added when its details became known. Here Krebernik, Marzahn and Selz's interpretation of a Fara tablet as an example of a work in progress rather than a retrospective product is a useful model.¹⁴⁸ It is clear that texts based on previous documentation could be prepared before all its sources were available. This suggests a level of comfort with the time constraints of clay. The above interpretation implies that, systemically, scribes were aware that in some cases the length of time it would take for them to complete their tablet would be longer than the time its clay would remain amenable to inscription in the ordinary way. They were able to maintain the moisture of the tablet, but did not always choose to do so. Further, the product of this decision was deemed acceptable to the official administration.

14 Re-moistening of clay vehicles

Inextricably linked to dry-writing is the phenomenon whereby the clay appears to have been re-moistened. This is the opposite reaction to the situation faced by a

¹⁴⁷ Steinkeller 2004.

¹⁴⁸ Krebernik, Marzahn and Selz 2005, 47.

scribe confronted with drying clay. It is detectable through the clay of a later part of an object appearing to be moister than the earlier part. There is of course a difference between maintaining moisture through a damp cloth and re-moistening drying clay the same way, although how we would detect this is unclear. They are treated here together, as parts of the same spectrum.

Neo-Assyrian historical inscriptions on prisms offer an ideal test case. They are the longest texts in cuneiform that would be written on a single object. Their writing surface can be as long as 50 cm or more on each of multiple faces, comprising hundreds of lines in total. It is not normal to find dry-writing on them. Rather, re-moistening seems to be common. It can be seen that the wedges inscribed on faces towards the end of the prism displace more clay than those impressed on earlier faces, as a result of the clay being moister.¹⁴⁹ Examples include BM 98972 (last three columns), BM 117901 (last two columns), and BM 134431 (final column). The practice also seems to have been applied to tablets too. For example, BM 76651 is a Neo-Babylonian offerings ledger. The script on the reverse differs from that on the obverse, and was apparently written on re-moistened clay. And Sm 794 is a Neo-Assyrian lament with a library colophon attached, which seems to have been written on clay that is moister than the main text. Examples can be cited from such earlier periods too, such as Ur III tablet BM 19162, a grain account the reverse of which was written on remoistened clay.

15 Conclusion

The clay-and-stylus toolkit is characterised by inherent temporal constraints that do not apply to other writing technologies. By the time the tablet has been shaped and is ready for use, a clock has already started. From this moment, a relatively narrow window of time remains during which it can be inscribed. Yet tablets nevertheless possess complex chronological properties; the oft-perceived race against time requires nuance. It has not yet been possible to determine the rate at which cuneiform was written. We therefore don't know how long it would have taken to write a text of any given length. But this more-or-less mechanical consideration is not the determining factor. Tablets capture more than just a single snapshot of time, and therefore contain more than just a single, simple glimpse of reality. They could be inscribed over a period of time, not necessarily in sequence,

¹⁴⁹ Some prisms, such as BM 128231, were inscribed whilst conspicuously moist; it is unclear whether this reflects the situation at the start of inscription or a re-moistening episode.

and possibly by more than one person. Their lifespan could also be extended well beyond the normal drying period. It was possible to write many hundreds of lines of text on a single object.

A wide range of secondary marks can be found on clay tablets. Often these are not noted in Assyriological publications, and can be omitted from hand drawings. Relevant fields to record this kind of information are lacking from the standard Assyriological databases. When such features are noticed and recorded, there is no agreed terminology to describe them. Non-textual features such as marks, blank space, erasures and the like can be significant for our reconstruction of the administrative systems that produced the tablets we study. This paper draws attention to features and provides examples of them. Proper understanding of them awaits detailed analysis of archives and other text groups, which falls beyond the scope of what is possible in this chapter.

Examples of the phenomena described above are deliberately drawn from across the cuneiform corpus. Given the vast stretch of time over which cuneiform was written, we cannot assume a single set of practices, whether scribal or bureaucratic. This is plainly evidenced, for example, in the different order (visible through sealing practices or writing on dry or remoistened clay) in which main texts, summary, and date were inscribed in the examples provided. But we can assume a degree of shared experience deriving from the material properties of clay. Clay captures multiple strands of evidence that can help us better understand the nature and significance of the inscriptions preserved on tablets, beyond the simple wording of their text. Features often cluster together, and these clusters potentially offer diagnostic signatures of bureaucratic practice.

Abbreviations

Assyriological abbreviations for museum collections and secondary publications follow CDLI contributors (2025), *Abbreviations*, Cuneiform Digital Library Initiative, available at <<https://cdli.mpiwg-berlin.mpg.de/abbreviations>> (accessed on 9 February 2025).

CAD = *The Assyrian Dictionary of the University of Chicago*, 21 vols, Chicago, IL: The Oriental Institute / Glückstadt: Augustin, 1956–2010.

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Cécile Michel

Erasing Signs and Lines on Old Assyrian Cuneiform Clay Tablets

Abstract: About 22,860 cuneiform clay tablets were excavated in the lower town of Kültepe, the ancient Kaneš, in Central Anatolia. The great majority date to the first half of the nineteenth century BCE and belong to Assyrian merchants originating from Aššur, in the north of Iraq. Their archives include letters, legal texts, and accounting documents. A significant part of the population of Aššur and Kaneš was literate, having either received a formal scribal education or learned to read, write, and count within their families. Many of the tablets found at Kültepe, probably written by the second group of literate people, show signs and even whole lines that have been erased. The analysis of various examples should make it possible to answer different questions. What techniques were used to erase one or more signs? Under what circumstances were the signs and words erased? Are there particular places to erase text on a tablet? Is this practice of erasing attested to by the texts themselves? This study on the practice of erasing signs and lines on clay tablets focuses on an Old Assyrian archive of a thousand tablets excavated in 1993 at Kültepe and belonging to Ali-ahum and his children Aššur-taklāku and Tariša.

1 Introduction

Clay is a plastic material with many qualities, which explains its use as a writing medium for cuneiform, linear A and B, and Cretan hieroglyphs.¹ Over the past two decades, more and more Assyriologists have become interested in the materiality of writing and have devoted studies to the material characteristics of cuneiform clay tablets. The main features of clay tablets have been described as follows:

¹ See the most recent book on clay edited by Xavier Faivre (2023a), which gathers several contributions on the use of clay tablets for writing. For the practice of erasing cuneiform signs on wax tablets, which is technically similar to the process for clay, see Cammarosano 2024, 172–173, 177–178, with previous literature. Unless otherwise stated, I took all the photos reproduced in the essay. The symbols “...” indicate signs or full lines deliberately erased. On the recycling and editing of cuneiform tablets, see also the contributions by Michele Cammarosano and Jon Taylor in this volume.

‘They were written by hand and are thus unique; they were transportable; they could be enclosed in an envelope; they could bear annotations or drawings and be erased or recycled; they could also be grouped into books of a sort and arranged in archives and libraries’, and, as such, they belong to the category of manuscripts.² The ability to erase signs or lines is an important feature that was widely used in Mesopotamia and neighbouring regions employing cuneiform scripts in all periods.

This practice is particularly well attested in private documentation for immediate use, as can be seen in the Assyrian merchants’ archives uncovered in the lower town of Kültepe, the ancient Kaneš, in Central Anatolia. These cuneiform clay tablets include letters, legal texts, and accounting documents. A significant part of the inhabitants of Aššur (north of Iraq) and Kaneš was literate, from well-educated merchants to those who learned the rudiments of writing,³ and many of their tablets show signs and even whole lines that have been erased.

After a brief overview of the literature dedicated to the erasing of cuneiform signs on fresh clay tablets, this chapter intends to answer different questions. Is the practice of erasing signs attested on the Old Assyrian Kültepe tablets? Under what circumstances were signs and words erased? Are there particular places to erase text on a tablet? What techniques were used to erase one or more signs? The analyses, carried out on examples originating from a single Kültepe archive, enable us to look at the practice of erasing within the same group of people and to evaluate of the frequency of this practice in relation to literacy.

2 Erasing signs on cuneiform clay tablets written for utilitarian purposes

Clay cuneiform tablets written for an immediate utilitarian purpose – such as letters and legal, administrative, and school texts – were only dried in the sun and not baked. They could then, in theory, be placed in a container with water and reshaped anew.⁴ A very common practice was to take advantage of the easy mal-

² Michel 2021, 107.

³ Michel 2008.

⁴ Faivre 1995; Charpin 2008, 17 with a photo of a Mari administrative text in the process of being recycled; Faivre 2023b; and Michel 2023a, 103. Jonathan Taylor and Caroline Cartwright (2011, 318) suggest that the recycling of clay tablets was not so common due to the wide availability of the material.

leability of fresh clay by erasing signs to correct an error while writing on a tablet. In practice, this involved smoothing the surface of the fresh clay with a finger or a tool to obtain a surface ready to receive a new text. Erasure left traces, and it is possible to observe the corrections of the writer, as the erased signs or original line have often only partially disappeared.

2.1 Erasures on cuneiform clay tablets

It is generally accepted that clay tablets, once shaped, were written in one go, as long as the clay remained fresh. It is therefore mainly during the writing of a text that the scribe could make corrections, by flattening the surface to remove one or more signs that had already been formed. Dominique Charpin observes that, for Old Babylonian texts, erasures are regularly found at the end of lines. Scribes used to justify lines on the right. After writing the first syllables of a word, if it turned out there was insufficient space to complete the word on the same line, they would erase these first syllables, as well as the last sign of the previous word, which they would rewrite further to the right to align it with the other lines.⁵

According to Jonathan Taylor, erasures are not so common, as scribes were careful when writing a tablet and avoided deleting text, because such corrections remained visible.⁶ However, a single accounting transactions on a document, for example, could be erased, and this left traces. Palimpsests would be found only on type II school tablets: the left column was written by the master and copied by the student several times in the right column.⁷ Between two exercises, the pupil erased the right column to practise writing. As a result of this repeated erasure of the student's column, it would eventually break off. These successive exercises were written in a very short period, since clay had to stay fresh. In Iraq, a tablet might become dry in an hour.⁸

There is a debate, in Assyriology, about the possibility of erasing text from an already dried tablet and writing new text on it. Jonathan Taylor and Caroline Cartwright consider that remoistening was not a technique practised by scribes, as adding water to the surface of an already dry tablet does not restore the clay to its original plastic state, but rather turns its surface into sludge: 'Erasure and re-

5 Charpin 1989, 59.

6 Taylor 2011, 19. This applies most probably to official and library texts.

7 Charpin 2008, 75–77.

8 Taylor and Cartwright 2011, 311.

inscription is not a technique that would be suitable for use on old, long-dry archival tablets'.⁹

Other authors consider that erasing signs on dry clay tablets was possible and is even described in the cuneiform documentation (see Section 3).¹⁰ The analysis of the different techniques and practices for erasing cuneiform signs and lines on clay tablets developed here focuses on the Old Assyrian private archives unearthed at Kültepe in Central Anatolia, a corpus which lends itself well to this type of study.

2.2 Clay tablets from Kültepe

About 22,860 clay tablets, envelopes, and bullae, covered with cuneiform signs, written in the Old Assyrian dialect and syllabary, were discovered at Kültepe, nearby the modern city of Kayseri.¹¹ They form the archives of merchants, mainly originating from Aššur, who settled there during the nineteenth and eighteenth centuries BCE, and document the long-distance trade established between Aššur and Anatolia. These archives consist almost half of letters and half of legal texts, personal accounts, and memoranda.¹² A dozen school texts, as well as several incantations and some other non-commercial texts, are scattered among a few archives. All these tablets were stored in sealed containers in private houses, in a specific room dedicated to the storage of goods and tablets.¹³

Because the Old Assyrian tablets were written for an immediate utilitarian purpose, they regularly include erased signs and lines. Most of the time, signs were erased while a tablet was being written, usually by smoothing the surface with a finger. Occasionally, however, tablets that had already been archived were remoistened to remove names or words, or even to change the text.¹⁴ The following examples show clear instances of erasing signs and lines while the tablet was still fresh.

⁹ Taylor and Cartwright 2011, 313.

¹⁰ Faivre 2023b, 126; Michel 2023a, 103.

¹¹ Michel forthcoming.

¹² Michel 2020, 11–20 with previous bibliography.

¹³ Michel 2023b.

¹⁴ Michel 1995.

2.3 Different types of erasures on Old Assyrian clay tablets

Old Assyrian tablets show a great variety of erasures, whether of signs or lines, and the traces left on the surface of the clay suggest the use of different techniques. A few signs may be erased at the beginning or end of a line, and less often in the middle (Figs 1a–c).

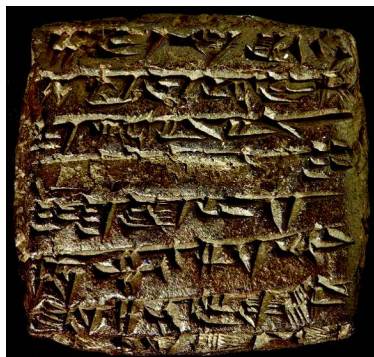


Fig. 1a: Prag I 601; five signs are erased at the beginning of the obverse line 4 (ù PN). Photo: CDLI P359203.

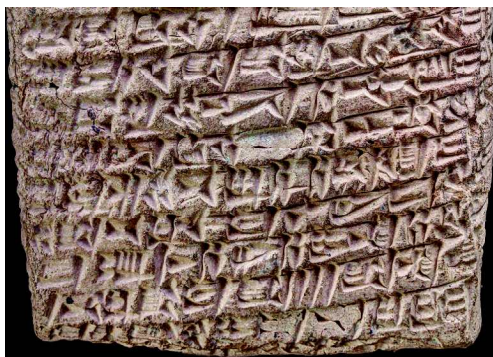


Fig. 1b: BIN 4, 32; signs in the middle of the reverse bottom line and the sixth line before the end are erased. 'Tablet. Letter concerning terms of business agreement. Old Assyrian. Clay', <<https://collections.peabody.yale.edu/search/Record/YPM-BC-004638>> (accessed on 20 April 2024). Photo: Yale Babylonian Collection, Peabody Museum.



Fig. 1c: CCT 3, 19b; the last two signs of the second line of the lower edge are erased. Photo: CDLI P358577.

Sometimes, full lines are erased, even several lines in a row, presumably corresponding to one or more of the recorded transactions. In an anonymous personal account, the lines deleted at the beginning of the obverse and end of the reverse represent a total of five and a half lines (Figs 2a–b).



Figs 2a–b: Sample caption BIN 4, 203: lines 2 and 3 of the obverse as well as two and a half lines from the bottom of the reverse are erased. Photo: CDLI P293749.

An Old Assyrian tablet discovered in a room of the Old Palace in Aššur presents a school exercise (Fig. 3).¹⁵ It is a fragment of a type II text, and words written with cuneiform signs remain only on the left column, written by the master. The right column was kept moist all through the exercise, during which the student copied the text of the master, erased it after being checked, and copied it again several times. The right column has been erased with a tool several times, leaving scratches and traces of wedges.

¹⁵ Pedde and Lundström 2008, cat. no. 1097, VAT 10048 (Ass 19478). A photo of the tablet is reproduced in Marzahn (ed.) 2008, cat. no. 377 and Cancik-Kirschbaum 2008, 347, fig. no. 263.



Fig. 3: Old Assyrian school text (type II) from Aššur; the right side has been erased several times by the student; VAT 10048, Vorderasiatisches Museum.

3 The emic approach of erasing signs according to the early-second-millennium texts

Texts rarely document the gesture of erasing signs on a clay tablet, because this action was generally accomplished while writing the tablet. Consequently, and for reasons of temporality, only erasures made a posteriori are eventually quoted. Moreover, when erasures are mentioned in the cuneiform texts from the early second millennium, the focus is more on the words that have to be erased than on the technique used to erase cuneiform signs.¹⁶ This is the case in, for example, a letter sent by Hammu-rabi to his governor in Larsa, Šamaš-hazir. The king explains that his surveyor had marked out on a tablet a field for one of his soldiers, Lipit-Ištar, but that, in the latter's absence, the substitute for this soldier had had

¹⁶ One needs to make a distinction between erasing signs (*pašāṭum*, often used for royal inscriptions) and smashing or dissolving a clay tablet (*pussusum*). For an overview of the vocabulary linked to clay tablets, see Faivre 2023c, 87–88.

Lipit-Ištar's name erased and his own written in its place.¹⁷ The tablet, if made of clay, was presumably dry, as the erasing was done some time after its writing. In fact, the use of the Š-stem applied to the verb *pašātum* ('to erase') suggests that Lipit-Ištar's substitute took the tablet to a literate person for this criminal act. The modification was not invisible, since the deception was revealed.

The Old Assyrian vocabulary to express the act of erasing signs on a tablet is quite varied.¹⁸ In a letter addressed to Imdī-ilum, Puzur-ilī asks for a correction to be made on a contract already written and presumably archived:

Concerning the 30 *kutānum*-textiles that you sold to Ennum-Aššur, and for which you wrote a tablet indicating that we were jointly liable for 10 minas of silver over a 5-week period (and concerning the fact that) Ennum-Aššur took the *kutānum*-textiles, yourself look for Ennum-Aššur (and as to) the tablet on which my name is written down, erase my name and write down the name of Ennum-Aššur.¹⁹

The verb *ṭabā'um* at the D-stem, *ṭabbu'um*, is used here with the meaning 'to erase', but may also refer elsewhere to the cancellation of tablets.²⁰ In this instance, as in the previous example, the request is not only to erase a name but to write another name in the same space, something which surely left traces on the tablet.

Since these texts refer to the practice of erasing signs on already dried tablets, one wonders how this was technically done. Another letter gives some hints about the procedure for erasing a sentence on a dried tablet which has been archived for a while. Sabasiya wrote to Puzur-Aššur the following:

Concerning the tablet relating to the house of Wašhuba about which you wrote me, take Ilabrat-bāni with you, open the tablet (container), take out the tablet concerning 49 minas of silver representing guarantees for the two houses of Anah-ilī, the priestess, his sister, and Āl-ṭāb, his brother, and on the tablet supplement these men are recorded. Where these men are recorded as judges, moisten (it) with water and erase, then seize the two houses.²¹

17 TCL 7, 15 (AbB 4, 15):9–13, *i-na la wa-aš-bu-ut li-pi-it-Ištar*, ¹lu-^dnin-šubur-ka dah-šu, *šum* ¹Li-pi-it-Ištar *ú-ša-ap-ši-iṭ-ma*, *šum-šu i-na a-ša šu-a-ti, ú-ša-aš-ṭe₄-er*. The verb used in this letter to express the act of erasing is *pašātum* at the Š-stem.

18 Michel 1995, 25–26.

19 CCT 2, 50:11–23, *a-na 30 ku-ta-ni, ša a-na En-um-A-šur, ta-dí-nu-ma*, 10 *ma-na kù-babbar, a-na 5 ha-am-ša-tim, ṭup-pá-am i-na qá-qá-ad, šál-mi-ni : tal-pu-tù, ku-ta-ni : En-um-A-šur, il₅-qé-ú : En-um-A-šur, a-ta šé-e : ṭup-pá-am, ša šu-mi lá-áp-tù, šu-mi : ṭá-bi₄-ma : šu-mi, En-um-[A]-šur-ma : lu-pu-ut*.

20 For such instances, see, for example, CCT 3, 15:22 and KTS 1, 34a:5.

21 KTS 2, 9:2–14, *a-šu-mi ṭup-pi-im, ša é Wa-áš-hu-ba ša, ta-áš-pu-ra-ni I-lá-áb-ra-at-ba-ni, iš-tí-kà ša-ba-at-ma ṭup-pi pé-té-ma, ṭup-pá-am ša 50 lá 1 ma-na kù-babbar, ša A-na-ah-dingir guš-ba-áb-tim*

The blank space left by the erasing in this instance was not written upon again. The lines to be erased were written on a supplementary ‘page’.²² Sabasiya outright asks his correspondent to forge a document in order to erase the names of embarrassing witnesses and take possession of houses put up as collateral. And, in the same letter, he asks Puzur-Aššur to modify another tablet:

There is a tablet (stating) that the creditor has loaned 21 minas 10 shekels of silver to Šalim-Aššur, Ikūnum, and Sabasiya, and that concerning the silver, (these men) are jointly liable; take out this tablet, examine it, and where it is written: ‘The silver was taken in the name of Iliš-tikal’, moisten (it) with water (and erase it) and show to the son of Šalim-Aššur what is important for you (on the tablet). And if he wants to settle the matter, let him settle (it). I have paid the silver to the creditor and taken out the tablet, (so) settle the matter as best as you can.²³

In this loan contract, the name of the person who commissioned the loan must be removed. Sabasiya, who appears as one of the three debtors, seems to have paid his part and does not want to be involved anymore, even though the debtors are jointly responsible. The erasing technique described in this text is relatively simple. The tablet was already archived and thus completely dry. So the lines to be erased must be moistened with water and then the signs erased by smoothing the damp surface with a finger.

These different examples show that it was not unusual to make modifications to tablets already in storage, by erasing signs and either leaving a space blank or rewriting something different on the surface. Note that, when an error was made on a contract, instead of erasing an already stored tablet, corrections also could be made copying again the document with the addition of an addendum specifying the correction, as did the author of a loan contract. This text concerns a loan of 17 minas of refined silver granted by Aššur-idi to Šumī-abiya and Aššur-damiq, to be paid within twenty-four weeks and dated to the month Kuzallu (xi); the writer adds after the list of witnesses: ‘In his tablet he wrote by error (month) Te’inātum (x)’.²⁴

a-ha-tí-šu, ù A-al-du₁₀ a-hi-šu ša 2_{še-na} bé-ta-an, e-ru-ba-tù-ni šé-li-ma i-na, ši-ba-at ṭup-pí-im a-wi-lu a-ni-ú-tum, wa-du-ú a-šar a-wi-lu a-ni-ú-tum, da-a-nu wa-du-ú : ma-e : ší-qí-ma, ha-li-iq é^{ti} ki-lá-li-ma, qá-at-kà li-iš-ba-sú-nu.

²² For tablet supplements or second pages, see Michel 2023c, 24–28.

²³ KTS 2, 9:15–27, *ṭup-pu-um ša 21 ma-na 10 gín kù-babbar, ša i-še-er Ša-lim-A-šur I-ku-num, ù Sà-ba-sí-a dam-gàr i-šu-ú, kù-babbar i-qá-qá-ad šál-mi-ni ra-ki-is, ṭup-pá-am šé-li-šu-ma a-mu-ur-ma, a-šar kù-babbar a-šu-mi lī-li-is-tí-ká, lá-qé-e wa-du-ú ma-e ší-qí-ma, dumu Ša-lim-A-šur a-pu-tí-kà-ma, kà-li-im-šu-ma šu-ma a-wa-tám, i-ga-mar li-ig-mu-ur, kù-babbar a-na dam-gàr áš-qú-ul-ma, ṭup-pá-am ú-šé-ši a-ma-lá ta-le-e-ú, a-wa-tám guš-mu-ur.* AKT 1, 25 is a copy of this text with small variants.

²⁴ KTS 1, 44b:20–23, *i-na ṭup-pi-šu, Té-i-na-tim, im-ši-i-ma, ilš-pu-ut.*

4 The practice of erasing within an Old Assyrian archive

The few above-examined documents seem to suggest that the practice of erasing signs on a tablet was not uncommon and not limited to the moment of writing, but could occur on tablets already dry, or even archived. To estimate the frequency with which such a practice was used and the methods employed, the study now focuses on the examination of tablets belonging to a single archive.

4.1 The archive of Ali-ahum, his son Aššur-taklāku, and his daughter Tariša (Kt 93/k)

During the 1993 season at Kültepe, the Turkish archaeological team under the direction of Tahsin Özgüç excavated two badly destroyed houses located on squares LVII/127 and LVIII/127–128. They completed the clearing of this area at the beginning of the 1994 excavations. In all, they unearthed a thousand tablets belonging to Ali-ahum, son of Iddin-Suen, as well as to his son Aššur-taklāku and his daughter Tariša.²⁵ The fire which destroyed the houses had the effect of baking the tablets, which turned various colours according to their position in relation to the fire: white, black, reddish brown, beige, etc. (Fig. 4).²⁶

²⁵ For this archive, see Michel 2008; for the women attested in this archive, see Michel 2015.

²⁶ I wish to thank Tahsin Özgüç and Fikri Kulakoğlu, the successive directors of the Kültepe excavations, who entrusted me with the publication of this archive.



Fig. 4: Some tablets excavated at Kültepe in 1993.

The archive comprises more than 40 per cent letters, 25 per cent contracts and other legal texts, 15 per cent personal accounts, some unidentified documents, and many fragments of envelopes. Most of the tablets are well written and several hands can be identified, especially that of Aššur-taklāku. Both the general shape of the letter and memoranda tablets, as well as the script of the tablets presumably written by him are very characteristic.²⁷

At least sixty tablets from this archive show clear signs of erasure, and it is highly likely that a closer examination of each object would reveal many more. Some of these erasures, though very few, are unintentional, because the signs erased – almost certainly inadvertently – are necessary to understand the text

²⁷ Michel 2015; Beyer 2019.

properly. This is, for example, the case with the tablet Kt 93/k 317:²⁸ before it was dried, the scribe or other person who manipulated it partially erased a few signs on two lines, presumably pressing it with their fingers or the palm of their hand (Fig. 5).



rev. *A-šur-i-mi-tí :*

16 $2\frac{1}{2}$ <túg> *a-na ni-is₅-ha-tí-kà*
ni-dí-[in] 2 túg a-na

18 *A-la-b[i-j]m : iš-tù ší-im*
2 túg ù ku-ta-nim : ga-am-ru-/ni

Fig. 5: Letter from Ali-ahum; Kt 93/k 317; top of the reverse.

The great majority of the erasures observed are, however, intentional. The writers deleted signs in specific places, sometimes full lines, and used various techniques to accomplish this.

4.2 Signs erased within a line

The most frequent erasures concern signs at the end of a line. Contrary to the Old Babylonian practice of justifying lines on the right, eventually leaving blanks in the middle of a line, the writers of the Old Assyrian tablets filled the lines with signs from left to right, tightly packed together, and could leave a blank at the end of the line if there was not enough space to write a word in full.

²⁸ Kt 93/k 317:14–19: ‘(From those of the consignment of) Aššur-imiti, we ga[ve] $2\frac{1}{2}$ <textiles> for your import tax, 2 textiles for Ali-ab[u]m. Since the price for 2 textiles and a *kutānum*-textile has been spent (...)’.



- obv. 1 *ma-na kù-babbar ší-mi-ša*
 2 *ša Ab-ša-lim* (°x x°)
A-šur-ta-« ta »-ak-lá-/ku
 4 *dumu A-lá-hi-im*
a-na Ha-ri-ma (°x x°)
 6 *Áš-ha-al-kà : a-ší-tí-šu*
ú Ištar-sí-im-tí
 8 *iš-<qú>-ul : šu-ma*

Fig. 6: Kt 93/k 215; obverse.

On the personal memorandum Kt 93/k 215,²⁹ the two signs erased at the end of line 2 do not correspond to the word written at the beginning of the next line (Fig. 6). Rather, the writer started another word and erased it. There are also two signs erased at the end of line 5, which could eventually be ‘*áš*’ and ‘*ha*’, the two first signs of the name Ašhalka, written in the next line.³⁰ In both lines, the signs were erased using a finger to smooth the surface of the fresh clay. In any case, the writer of this tablet must have been particularly distracted, since he or she duplicated a sign in the proper name Aššur-taklāku (line 3) and omitted a sign (line 8) in the conjugated verb *išqul*.

Old Assyrian writers repeatedly ran out of space at the end of a line to complete a word. The last sign is often written at the very end of the line on the right-hand edge, or slightly below the line. However, in some instances, the writer decided to not complete the word, and instead erased the one or two signs already written, so as to start again at the beginning of the next line (Fig. 7).

²⁹ Kt 93/k 215:1–8: ‘Aššur-taklāku, son of Ali-ahum, has p[ai]d 1 mina of silver to Harima, Ašhalka, his wife, and Ištar-simti for the price of Ab-šalim. If (...)’.

³⁰ Such a practice is clearer in the following example: Kt 93/k 317, Fig. 7.



- 6 1 *ku-ta-nam a-na ra-q[á]-/tim*
ni-dí-in ší-tí (°šú°)
 8 *šú-ba-tí-kà 50 túg*

Fig. 7: Kt 93/k 317; middle of the obverse.

At the end of line 7 of the tablet Kt 93/k 317,³¹ there is one sign erased, for which the last vertical is visible as well as one smaller vertical just before plus the head of an upper horizontal. The erased sign was a ‘šú’ and there appears some space for another sign before the ‘tim’, which belongs to the end of the above line. The writer started to write the word *šubātika* before realising he or she would not have enough space for the four signs; he/she then erased the ‘šú’ and wrote the complete word at the beginning of the next line. The surface of the clay was smoothed with a finger, but the heads of three wedges are still visible.

Experiments made on a freshly written tablet show similar traces after the erasing of two signs at the end of a line by smoothing the surface of the clay several times with the thumb: the deeply impressed head of the wedges are still visible (Fig. 8).

Note that signs also could be erased in the middle of a line, even though this appears less often. In such cases, the writer had forgotten a word or started to write something else before realising the mistake.



Fig. 8: Experiment; erasing the last two signs of a line on a freshly made and written clay tablet.

³¹ Kt 93/k 317:6–8: ‘We gave 1 *kutānum*-textile for one thin textile. The remainder of your textiles – 50 textiles (...)’.

4.3 Erasing full lines with a finger

The same erasing technique of smoothing the clay's surface with a finger could be applied to full written lines. This occurs especially at the end of a tablet, on an edge. The second and last line of the left edge of Kt 93/k 60 (Fig. 9) has been erased;³² however, the text is still readable and looks incomplete. Because there was not enough space on the tablet to finish the sentence, whoever wrote it gave up on that last sentence and deleted it.



le.e. *i-li-biā Šu-li*

20 (°[x] gín kù-babbar *a-na A-šūr/ki*°)

Fig. 9: Kt 93/k 60; left edge.

The same technique was applied in the next example, Kt 93/k 450, but, here, the two first signs are preserved and only the rest of the line is erased (Fig. 10).³³ However, the scribe did not bother to erase the line all the way to the end, considering it sufficiently clear that the signs on the right are not to be read. The erased signs can still be guessed at and correspond to the logogram ‘dumu’ and the first three signs of the name Buzutaya. Since the writer was unable to find space for the final ‘a’, he/she decided to erase the four signs and start anew on the beginning of the following line.

³² Kt 93/k 60:19–20: ‘are on the account of Šuli’.

³³ Kt 93/k 450:14–18: ‘Buziya, son of Bazaza gave his testimony. Šuli, son of Buzutaya was my partner’.



Fig. 10: Kt 93/k 450; bottom of the reverse and upper edge.

In the following experiment (Fig. 11), two lines were erased, smoothing the clay with the index finger, just after they had been written. The erased wedges are still visible and a few signs can still be read.

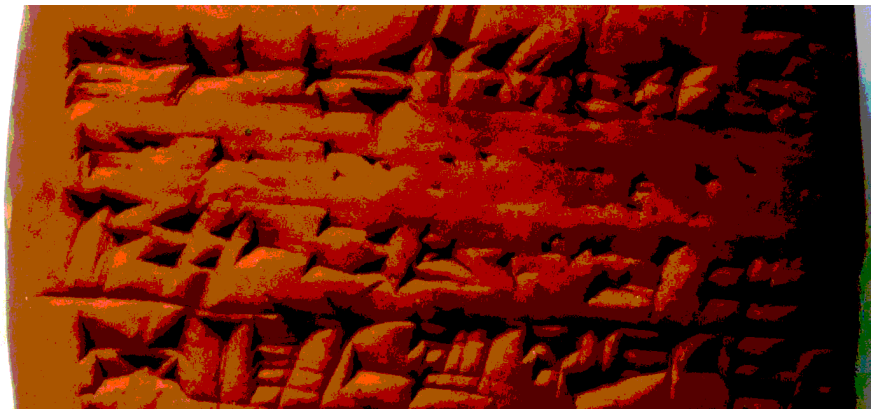


Fig. 11: Experiment; erasing two lines on the middle of a freshly made and written clay tablet.

In some instances, a full record may be erased. The writer of the personal account Kt 93/k 712, listing various transactions of silver, (or someone else) decided to erase one of these transactions completely (Fig. 12).³⁴



Fig. 12: Kt 93/k 712; personal account on which a complete transaction has been erased.

³⁴ Kt 93/k 712:1–7, 12–18: ‘4 minas 4 shekels of silver from the consignment of Aššur-ṭāb, son of Hurašānum, 1 mina of silver from Ennānum, son of Abiya, he took in the City (of Aššur). (erased transaction). I took the price of 5 mana with Ušur-ša-Ištar, 7 mana 5 shekels with Aššuriš-tikal, son of Sukkalliya, 15 shekels with Aššur-ṭāb’.

It seems that the tablet was in the process of drying when four and a half lines were erased, because signs remain visible, and even readable, on lines 11 and 12. It is not clear how the surface was erased, possibly with fingers or, more likely, with a smooth material, perhaps a wet textile.

4.4 Erasing lines with a tool

In some instances, a tool was used to erase signs or a line and has left a specific imprint in the clay. This may correspond to the edge of the section of a stylus (Fig. 13),³⁵ or any other hard tool.

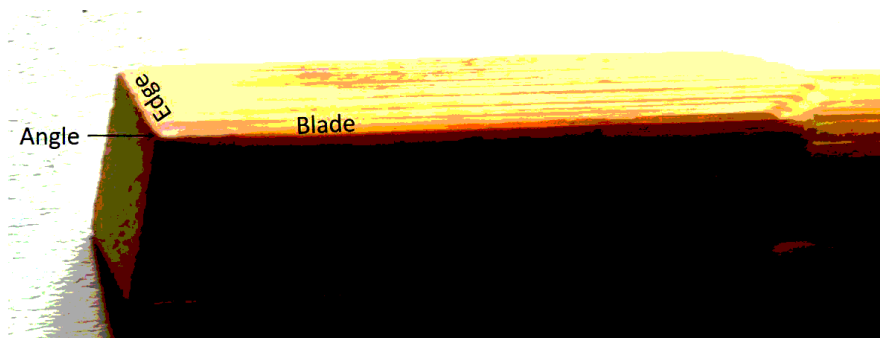


Fig. 13: Chopstick used as a stylus for the experiments described in this paper; writing: impressing the angle, then the blade (vertical tilt) to obtain a wedge; erasing: using the edge to smooth the surface of the clay.

The resulting erasure is more uniform than simple smoothing with a finger, and more or less straight lines have formed at the two ends of the tool. Several signs were erased presumably with the edge of a stylus on three consecutive lines on the reverse of the Kt 93/k 906 tablet (Fig. 14).³⁶ In line 24, the erasure concerns a number, possibly a fraction. The second half of line 25 has been erased, with only

³⁵ A tool, traditionally of reed, in the shape of a stick, often with a square section and a right angle at one end, applied on the surface of fresh clay to obtain negative cuneiform signs. See Cammarosano 2014.

³⁶ Kt 93/k 906:24–28: ‘including 12 shekels of silver of the import tax, the export tax was deducted, and he gave us the remainder of the silver: 5½ minas and 1 shekel’.

the heads of the vertical wedges remaining, and the last three signs in line 26 were made to disappear using the same technique.



- 24 12 (°x°) gín kù-babbar *ni-is-ha-/tim*
*wa-šf-tum*_x (°ù x x x x°)
 26 *iš-hi-ir-ma šf-ti* (°x x x°)
 kù-babbar 5½ *ma-na* 1 gín
 28 kù-babbar *i-df-ni-a-ti-ma*

Fig. 14: Kt 93/k 906; bottom of the reverse.

Using a stylus or any other hard tool to completely smooth out one or more lines is particularly easy to apply to the bottom, top, or side edge of a tablet (Fig. 15), or even to top or bottom line of the obverse or the reverse, as, due to the curvature, there is no risk of accidentally erasing nearby lines that should be kept.³⁷



- le.e. *mì-ma a-nim A-šur-be-el-a-wa-tim e-*
zi-ba-/am
 (°line erased°)

Fig. 15: Kt 93/k 337; left edge.

Erasing the bottom edge line of the tablet Kt 93/k 706 with a stylus formed a clay ridge across the entire width of the tablet (Fig. 16).³⁸

³⁷ Kt 93/k 337:le.e.: ‘all this Aššur-bēl-awātīm left me’.

³⁸ Kt 93/k 706:8–11: ‘Well, you have taken the merchandise of your father’.



- 8 *a-ma lu-qú-tám*
ša a-bi₄-ku-nu
 lo.e. (°line erased°)
 rev. *tal-qé-a*

Fig. 16: Kt 93/k 706; bottom of the obverse; lower edge and top of the reverse.

The end of a letter addressed to Ali-ahum by his son Aššur-taklāku has been completely erased; in all, thirteen written lines have disappeared. The surface of the clay, already in the drying stage, was smoothed with the help of a tool, presumably the blade of the stylus, used as a scraper (Fig. 17).³⁹ The status of the deleted text remains unknown; it was probably out-of-date or useless information.



- rev. *ša* [x x x x x x]
 22 *na-áš-pé-[er-tí x x x]*
ù a-šū-mi [x x x x]
 24 *I-[d]i-Sú-en₆ tù-[x x x]-ma*
 (°eight lines erased°)
 u.e. (°two lines erased°)
 le.e. (°three lines erased°)

Fig. 17: Kt 93/k 895; reverse; upper and left edges of a fragmentary letter.

³⁹ Kt 93/k 895:21–24: ‘of [...], [my] letter [...], and concerning [...] Iddin-Suen [...]’.

In the following experiment, a line was erased with the edge of a wood stylus on a clay tablet one hour after being written. Some wedges are still visible and the bottom of the tool traced a line on the clay (Fig. 18).



Fig. 18: Experiment; erasing a line with a tool on a clay tablet in the process of drying.

4.5 Computing and practising

The Assyrians knew in general how to size their tablets according to the length of the text to be written. Most tablets are completely filled, including the left side, and for letters, a small additional tablet, written on one side only, could be added.⁴⁰ Nevertheless, a few examples exist where the bottom of the reverse has been left blank. This unwritten-upon surface occasionally shows traces that may be the result of cuneiform signs being erased several times. This phenomenon is well known in other periods; the surface is referred to as a scratch pad and was, for example, used to compute.⁴¹ This possibly could be the case for the reverse of tablet Kt 93/k 290:⁴² the writer may have calculated the interest of the loan on the reverse and then erased the numbers with a tool (Fig. 19).

⁴⁰ Michel 2023c, 24–28.

⁴¹ Proust 2017.

⁴² Kt 93/k 290:6–9: ‘The interest for 10 months amounted to 1½ minas 4 shekels’.



obv.

6 1½ *ma-na* 4 gín

ša 10 iti-kam

lo.e. *ši-ib-tum*

rev. *i-li-ik*

(°surface erased°)

Fig. 19: Kt 93/k 290; reverse.

The following example, Kt 93/k 693,⁴³ looks much like the result of an exercise in writing a loan contract (Fig. 20). The words are cut over two lines, and the sentence is incomplete. The reverse has been erased and the surface was perhaps used for practising the writing of different signs.

⁴³ Kt 93/k 693:1–4: ‘29½ minas 3 shekels of silver to’.



obv. 29½ *ma-*
 2 *na* 3 *gín*
kù-babbar
 lo.e. *i-še*-(°x°)
 rev. *er*
 (°section erased°)

Fig. 20: Kt 93/k 693; an exercise?

4.6 Erasing the end of a dried or archived tablet

All the examples examined so far show erasures on tablets in the process of being written or in the process of drying. Old Assyrian documentation also mentions the possibility of erasing a word or sentence from an already archived tablet, and even writing a new text in its place (as mentioned in Section 3). The technique used in that case consisted of using water to remoisten the surface of the clay in the area to be erased. The clay would not regain all its plasticity, but would become soft again and take on the appearance of slip. The signs could then be completely erased, with the consequence that the waterlogged clay would spill over the ruling separating two lines of writing. For example, the last

line of tablet Kt 93/k 51 appears to have been wetted before being completely smoothed, perhaps with a finger, and the bottom ruling was partially covered by slip (Fig. 21).⁴⁴



rev.

2½ *ma-na* 5 *gín*

8 *an-na a-šu-mì*

Iš-me-lim i-ni-kà-sí

10 *Šu-Ištar ú-ša-hi-ra-am*

(°line erased°)

Fig. 21: Kt 93/k 51; reverse.

This may also be the case for the last two lines on the reverse of Kt 93/k 192, as small flows of clay cover the final ruling (Fig. 22)⁴⁵.

The following example is even clearer. The tablet Kt 93/k 688 seems to have been completely dried and presumably archived for a while, after which its lower edge and reverse were remoistened (Fig. 23).⁴⁶ The clay turned into slip and was smoothed with fingers, leaving faint streaks on the surface of the clay, until the cuneiform signs and even rulings disappeared: a new layer of clay, produced from the melted clay originally present in the tablet, partially covers the written lines. However, on the right part of the reverse the signs are still visible, as this part of the tablet was not soaked in enough water to restore any plasticity to the clay. Proof of the addition of water lies in both the change in the clay's colour and the small bump visible on the top left of the reverse, left

⁴⁴ Kt 93/k 51:7–10: '2½ minas 5 shekels of tin has been deducted from my account in the name of Išme-ilum'.

⁴⁵ Kt 93/k 192:13–14: 'Send me (x) silver their price'.

⁴⁶ Kt 93/k 688:1–6: '10 shekels of silver are with Amur-Aššur, 1 *pirikannum*-textile is with Tuma-na, since three years (they are) on their account'.

by the clay turned into slip. The five lines erased probably relate to a closed account.

An experiment was carried on a tablet fully dried for ten days (Figs 24a–b). After pouring water on the last line of one of its sides, the wet clay was then easy to smooth with a finger; the result obtained is similar to that of tablet Kt 93/k 688 (Fig. 23), with a lightening of the clay's colour and the appearance of a small bump of clay on the bottom right corner of the tablet.



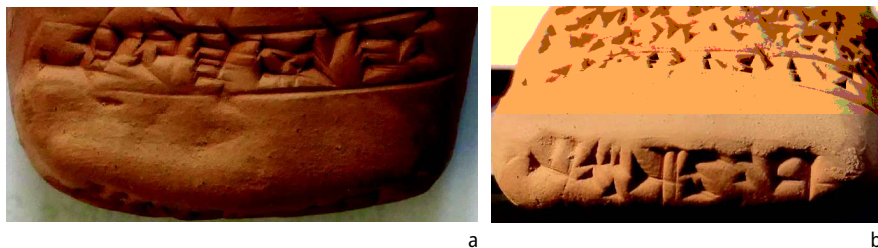
rev.
 kù-babbar ší-im-šu-nu
 14 šé-bi₄-lam
 (°two lines erased°)

Fig. 22: Kt 93/k 192; reverse.



obv. 10 gín kù-babbar
 2 *iš-tí A-mur-A-šùr*
 1 túg *pì-ri-kà-nu*
 4 *iš-tí Tù-ma-na*
iš-tù 3 ša-na-/tim
 6 *i-li-bi₄-šù-nu*
 lo.e. (*line erased°)
 rev. (*four lines erased°)

Fig. 23: The lines on the lower edge and the reverse of tablet Kt 93/k 688 have been erased with water.



Figs 24a–b: Experiment; remoistening a dry tablet to erase a line.

5 Conclusions

This overview of the numerous erasures observed on cuneiform tablets from a single Old Assyrian archive shows a wide variety of cases and techniques used. Erasures were commonly practised on fresh clay, in the course of writing. Signs and lines could be erased by smoothing the surface of the clay with a finger, or with the edge or blade of a stylus. Old Assyrian texts suggest that dried and archived tablets could also be partially erased when moistened with water, and changes in the text were sometimes made. Some tablets illustrate this practice: the remoistened clay has been smoothed and small bumps have appeared on the surface of the tablet. The various experiments conducted on newly written cuneiform clay tablets confirm the viability of different erasing techniques.

That erasure practice was widespread in the Assyrian merchant community contrasts with other milieus.⁴⁷ It must be put into perspective against the extensive literacy among the Assyrians, including both men and women, at the beginning of the second millennium BCE. They used a relatively limited syllabary of eighty to one hundred syllabic signs and only thirty to forty common Sumerian logograms. The small number of signs they had to learn compared to other periods facilitated this widespread access to writing, and, vice versa, having a great number of people with access to writing simplified the syllabary and limited the number of signs used.⁴⁸

⁴⁷ Taylor 2011, 19, writes: ‘While erasures are far from rare, the general impression is that scribes took sufficient care with inscriptions that relatively little use was made of erasure; this is perhaps connected to the feature that invisible erasure seems to be very difficult’. These observations derive mainly from Aššurbanipal’s library tablets from Nineveh (first millennium BCE).

⁴⁸ Michel 2008. School texts were found scattered in different houses of the lower town of Kaneš, as well as in Aššur, mixed in Middle Assyrian archives. They are adapted to the knowledge merchants required in their daily activities.

The Old Assyrian tablets nevertheless show different levels of writing. Some tablets are extremely well shaped and written and were clearly produced by a professional scribe or educated merchant. Other tablets are not as regular in their shape, layout, or writing but are globally correct and display features characteristic of members of the same family, such as the use of certain specific signs, the consistency of execution, and so on, which suggests that learning was carried out at home.⁴⁹ A last group of tablets are badly shaped, feature irregular signs, and are full of mistakes in signs, syntax, and grammar; these were produced by people who learned how to read and write on the job. The archive of Ali-ahum and his children, excavated in 1993 in the lower town of Kaneš, includes texts from all three categories. Erasures resulted, on the one hand, from hesitant use of cuneiform writing and carelessness, self-correction while writing, misjudgement of the length of a word to be written at the end of a line and, on the other hand, due to accounting purposes, such as the cancellation of a transaction on an archived tablet.

Abbreviations

AbB 4 = Fritz R. Kraus, *Briefe aus dem Archiv des Šamaš-Ḫāzir in Paris und Oxford* (Altbabylonische Briefe in Umschrift und Übersetzung, 4), Leiden: Brill, 1968.

AKT 1 = Emin Bilgiç, Hüseyin Sever, Cahit Günbattı and Sabahattin Bayram, *Ankara Kültepe Tabletleri*, vol. 1 (Türk Tarih Kurumu Yayınları, 6/33), Ankara: Türk Tarih Kurumu Basımevi, 1990.

CCT 2 = Sydney Smith, *Cuneiform Texts from Cappadocian Tablets in the British Museum*, vol. 2, London: British Museum, 1924.

CCT 3 = Sydney Smith, *Cuneiform Texts from Cappadocian Tablets in the British Museum*, vol. 3, London: British Museum, 1925.

Kt 93/k = Tablets found during the 1993 Turkish excavations at Kültepe, in the lower town, and preserved in the Anadolu Medeniyetleri Müzesi, Ankara.

KTS 1 = Julius Lewy, *Die altassyrischen Texte vom Kültepe bei Kaisarije: Keilschrifttexte in den Antiken-Museen zu Stambul*, vol. 1, Istanbul: Antiken-Museen, 1926.

KTS 2 = Veyssel Donbaz, *Keilschrifttexte in den Antiken-Museen zu Stambul*, vol. 2 (Freiburger Altorientalische Studien Beihefte, 2), Stuttgart: Frank Steiner, 1989.

TCL 7 = François Thureau-Dangin, *Lettres de Hammurapi à Šamaš-Ḫâšir* (Textes Cunéiformes, Musée du Louvre, 7), Paris: Librairie Orientaliste Paul Geuthner, 1924.

VAT = Vorderasiatische Abteilung, Tontafel, Staatliche Museen zu Berlin – Preußischer Kulturbesitz, Vorderasiatisches Museum.

⁴⁹ Beyrer 2021.

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Ashurbanipal and Objects for Esagil and Ešarra: A Case Study of Erasing, Removing, and Replacing Texts at the Height of the Assyrian Empire

Abstract: The destruction of Babylon and the removal of the god Marduk and prized cult objects from his temple Esagil in 689 BCE caused a great deal of changes in Babylonia and Assyria. Sennacherib's alterations to the Aššur temple and cult during the final years of his reign (r. 704–681 BCE) had a significant impact on the how his son Esarhaddon (r. 680–669 BCE) and grandson Ashurbanipal (r. 668–c. 631 BCE) supported the principal cults of the Assyrian Empire. This paper explores how Ashurbanipal navigated the complex alterations made to the Aššur temple and cult in Assur by his grandfather in order to restore Marduk's temple and cult in Babylon. This difficult-to-navigate task required Ashurbanipal to appropriate metal-plated objects from the Aššur temple (Ešarra), to remove inscriptions of his grandfather written on those holy items, and to replace those texts with new inscriptions dedicated to the objects' original owner, Marduk.

1 Introduction

When Assyria's last great king, Ashurbanipal (r. 668–c. 631 BCE), ascended the throne in late 669 BCE, he inherited the Assyrian Empire at the apex of its territorial expansion.¹ His vast holdings stretched from the Zagros Mountains in the east to the Mediterranean Sea and Cilicia in the west. From the very outset of his long reign, Ashurbanipal actively supported Assyria's most important temple Ešarra

¹ For overviews of Ashurbanipal's reign and inscriptions (with references to previous literature), see, for example, Novotny and Jeffers 2018, 1–36; Jeffers and Novotny 2023, 1–26; Frahm 2023, 273–300; Novotny, Jeffers and Frame 2023, 1–46; and Ponchia and Lanfranchi 2024, 293–328. The dates for Ashurbanipal's reign follow those given by the Royal Inscriptions of the Neo-Assyrian Period (RINAP) project (<<https://oracc.org/rinap/index.html>>, accessed on 21 January 2025). For a recent discussion, see Novotny, Jeffers and Frame 2023, 26–31. Note that the name of the Assyrian national god and the city with the same name are spelled respectively here as (the god) Aššur and (the city) Assur. The translations used here follow the RINAP project, but with minor variations.

(‘House of the Universe’) and Babylon’s main sanctuary Esagil (‘House Whose Top Is High’) – although that holy building was under the direct control of his older brother Šamaš-šuma-ukīn (r. 667–647 BCE), the king of Babylon – together with their patron gods, respectively Aššur (the Assyrian national god) and Marduk (the tutelary deity of Babylon).² The simultaneous care for these two important religious institutions, both of which were then regarded as a ‘bond of heaven and earth’, had become entangled not only due to his grandfather Sennacherib’s destruction of Babylon and its cults in late 689 BCE, but also due to that Assyrian king’s transformation of the Aššur cult and temple in the aftermath of Marduk’s abduction from Esagil (688–681 BCE), which included rededicating several important cult objects of Marduk to Aššur.³ In order to restore Esagil and Marduk’s cult to their former, pre-689 BCE glory, Ashurbanipal had to carefully appropriate metal-plated items originally belonging to Marduk that his grandfather had proudly given to Aššur. Part of Ashurbanipal’s delicate task involved removing inscriptions that Sennacherib had had written on the metal parts of those cult objects before he dedicated them to Assyria’s national god. Although none of these original objects survive today, some traces of Ashurbanipal ‘erasing’ or removing older inscriptions and replacing those texts with new inscriptions written in his own name exist.⁴ In this paper, the available evidence will be examined, in addition to presenting a few details that demonstrate that Ashurbanipal’s treatment of older inscriptions was not unusual, that is, he followed in the footsteps of his im-

2 For discussions of Ashurbanipal’s work on Ešarra and Esagil, see Jeffers and Novotny 2023, 18–19; and Novotny, Jeffers and Frame 2023, 17–20. For further information on these two temples, see, for example, Grayson and Novotny 2014, 20–22; Greis 2017; Pedersén 2021, 142–153; and Novotny 2023, 407–411. The English translations of the Sumerian ceremonial names of temples generally follow George 1993.

3 On Sennacherib’s religious reforms, which involved Assyrian scribes rewriting the Babylonian Epic of Creation (*Enūma eliš*) in such a way that Aššur was the protagonist and Assur was the universal bond, see, for example, Machinist 1984–1985; Frahm 1997, 20 and 282–288; Vera Chamaiza 2002, 111–167; Pongratz-Leisten 2015, 416–426; and Novotny 2023, 407–411.

4 This does not come as a surprise as relatively few inscribed metal objects from the Neo-Assyrian Period (as well as the Neo-Babylonian Period) have survived or are presently known. Thanks to tablet copies of inscriptions written on metal(-plated) objects decorating the interior of temples (and palaces), together with their scribal notes (often referred to in scholarly literature as ‘subscripts’), we have information about some of these metal objects. For some details, see Grayson and Novotny 2014, 5–8; and Jeffers and Novotny 2023, 4–9.

mediate predecessors, in particular his grandfather Sennacherib (r. 704–681 BCE) and his father Esarhaddon (r. 680–669 BCE).⁵

2 Brief historical background

Before diving into the central theme, it is necessary to briefly provide some historical context for Ashurbanipal's actions regarding the refurbishment and reinscribing of cult objects that he had returned to Marduk's temple Esagil in Babylon during his first fourteen years on the throne (668–655 BCE). In short, why was it necessary for Ashurbanipal to undertake this task? In order to do so, let us jump back twenty years before he became king, when his grandfather Sennacherib sat on the Assyrian throne.

Babylon was a constant and painful thorn in Sennacherib's side from the very moment he ascended the Assyrian throne in 705 BCE.⁶ However, it was not until the middle of his fifteenth year as king, in 690 BCE, that that city's very existence was threatened. Despite suffering a significant setback in a pitched battle near the city of Ḫalulê the year before (691 BCE), Assyria's armies laid siege to Babylon, leaving its king Mušēzib-Marduk and his troops to defend the city from inside the city walls. After fifteen long months, Babylon fell. Sennacherib, in the typical Assyrian fashion, recorded that he utterly destroyed the city and its temples. The so-called 'Bavian Inscription' described the events as follows:

I handed the property of that city – silver, gold, choice stones, possessions (and) property – over to my [people] and they kept it for themselves. My people seized and smashed the gods living inside it, and (then) they took their [possessions] (and) property. ... I destroyed, devastated, (and) burned with fire the city, and (its) buildings, from its foundations to its crenellations. I removed the brick(s) and earth, as much as there was, from the (inner) wall and outer wall, the temples, (and) the ziggurat, (and) I threw (it) into the Araḫtu river. I dug canals into the centre of that city and (thus) levelled their site with water. I destroyed the outline of its foundations and (thereby) made its destruction surpass that of the Deluge. So that in the

5 For overviews of these kings' reigns and inscriptions, see, for example, Frahm 1997; Leichty 2011, 1–8; Grayson and Novotny 2012, 1–27; Grayson and Novotny 2014, 1–30; Frahm 2023, 191–272; and Ponchia and Lanfranchi 2024, 240–292.

6 On Sennacherib's Babylonia problem (with references to earlier studies), see Grayson and Novotny 2012, 11–14; Frahm 2023, 213–235; and Ponchia and Lanfranchi 2024, 246–260.

future, the site of that city and (its) temples will be unrecognizable, I dissolved it (Babylon) in water and annihilated (it), (making it) like a meadow.⁷

In reality, the actual destruction was probably not as bad as he described. Babylon's principal temple, Esagil (and perhaps also the ziggurat Etemenanki ['House, Foundation Platform of Heaven and Netherworld']), which was regarded as the 'bond of heaven and earth', bore the brunt of Assyrian aggression (see Fig. 1). The destruction of Esagil – together with removal (and damaging) of its divine statues, furniture, and paraphernalia – did the unthinkable: it severed the universal bond that connected the divine and human realms. Despite Sennacherib's claims that his troops took the possessions and property of Marduk's temple for themselves, it is clear from inscriptions of his son Esarhaddon and his grandson Ashurbanipal (see below) that the most-prized and holy objects belonging to Babylon's tutelary god Marduk became the property of the Assyrian national god Aššur and were placed in Ešarra, situated in the heart of the city of Assur – the religious capital of the empire – and Ehursaggalkurkurra ('House of the Great Mountain of the Lands'), the cella of the god Aššur. Before some of these objects officially changed ownership, Sennacherib had inscriptions added to their metal plating. A few of the texts, including one that was written on Marduk's former bed and throne, included a lengthy opening dedication to the Assyrian national god. The prologue, as far as that text is preserved, read as follows:

[To (the god) Aššur], the king of the gods, the father of the gods, the lofty one, the creator, the great god, [*the one who moulds*] the Igīgū and Anunnakū gods, the one who holds the lead-rope of the [*great*] heavens, (the) deep-hearted (one) who deliberates (only) with himself, the assiduous one, [the regu]lator, the one who decrees fates, the splendid one, the perfect one, [the l]eader of absolutely everything, controller of the gods of heaven (and) netherworld; the exalted force that makes devastation come like the Deluge to the land where there is *negligence* (and) [har]dship, who makes a destructive flood sweep over all four quarters (of the world) – which are unsubmitive to his governor (Sennacherib) – so that tribute and payment is imposed upon them (and) so that they carry their (work) baskets daily, without interruption; the lord of everything who holds the lead-rope of heaven and netherworld, the one who dwells in Ehursagkurkur<ra> – the awe-inspiring shrine, exalted sanctuary, (and)

7 Grayson and Novotny 2014, 316–317 Senn. 223 lines 47–54a. Sennacherib's description of the destruction of Babylon is principally known from the so-called 'Bavian Inscription', a text written several times on the face of a cliff in stele-like panels in the vicinity of Hinnis (now Kharusa). Inscriptions of Sennacherib's son Esarhaddon and of the Neo-Babylonian ruler Nabonidus (r. 555–539 BCE) also refer to Sennacherib's destruction of Babylon. See, for example, Leichty 2011, 195–196 Esar. 104 i 18b–ii 9a; and Weiershäuser and Novotny 2020, 61–62 Nbn. 3 i 1'–19'. For an assessment of Sennacherib's destruction of Babylon and Marduk's abduction, see in particular Frame 1992, 55–56; and Richardson 2012, especially 237–238.

holy dwelling place – *the awesome radiance* (and) awe-inspiring luminosity that has mercy on their governor(s), his great [..., who] quickly accepts [supplicat]ions (and) prayers addressed to him, [who] makes his angry weapons rage [against] the unyielding, [...] the road to joy, [...] ... weapons [...] ... [...]⁸

It is unclear, as no textual evidence presently survives, whether or not Sennacherib erased or removed existing texts on those objects. These rededicated and (re)inscribed objects were only a small part of his numerous religious reforms that ‘Babylonised’ the god Aššur, his temple, his cult, and his New Year’s festival (the *akītu*). During the final years of Sennacherib’s reign (688–681 BCE), while Babylon and Esagil lay in ruins and Marduk and his entourage were held ‘hostage’ in Assyria, the god Aššur was transformed to be more like Marduk and his significantly remodelled Ešarra temple, with its new square, multi-room complex (the so-called ‘Ostanbau’), became the bond that held the universe together.⁹ Despite all of this lavish attention and support of Assyria’s most holy temple and cult, Sennacherib’s ‘Babylonisation’ of Aššur and Ešarra do not appear to have been well received.¹⁰

8 Grayson and Novotny 2014, 227 Senn. 161 obv. 1–20. Sennacherib had this new inscription placed on the metal coverings of the bed and throne.

9 Sennacherib’s multi-room complex (the so-called ‘eastern annex building’ or ‘Ostanbau’), whose construction is recorded in the ‘Aššur Temple Inscription’ (Grayson and Novotny 2014, 239–244 Senn. 166), was modelled on Esagil’s square-shaped ‘Sublime Court’, which was, according to inscriptions of his son Esarhaddon (Leichty 2011, 198 Esar. 104 iii 50–51), a replica of the constellation known as the ‘Field’ (*ikū*, the ‘Square of Pegasus’). The god Aššur’s Ešarra as the Assyrian counterpart of Marduk’s Esagil, at least the so-called ‘Ostanbau’, is referred to in several inscriptions of Esarhaddon and Ashurbanipal. Esarhaddon (Leichty 2011, 198 Esar. 104 iii 48–49) refers to Esagil as ‘a replica of Ešarra’ (*tamšil Ešarra*) and Ashurbanipal (Novotny and Jeffers 2018, 301 Asb. 23 line 29) states that the Aššur temple was ‘a replica of the temple of the Enlil of the heavens (i.e. Marduk)’ (*tamšil bīt Enlil ša šamē*). Moreover, one text of Esarhaddon (Leichty 2011, 109 Esar. 48 lines 98–99) explicitly calls Eḫursaggalkurkurra (the cella of Aššur) ‘the bond of heaven and earth’ (*markas šamē u eršetī*). Although Sennacherib himself does not record that the eight-gated complex that he had built onto Aššur’s temple was a replica of a key part of Marduk’s temple, it is clear from texts of his son and his grandson that the ‘Ostanbau’ was in fact modelled on Esagil’s ‘Sublime Court’ and its celestial counterpart, the ‘Square of Pegasus’, and was intended to create a link between heaven and earth, principally since the one at Babylon had been severed.

10 See, for example, the comments in Novotny 2014; and Novotny 2023, 411.

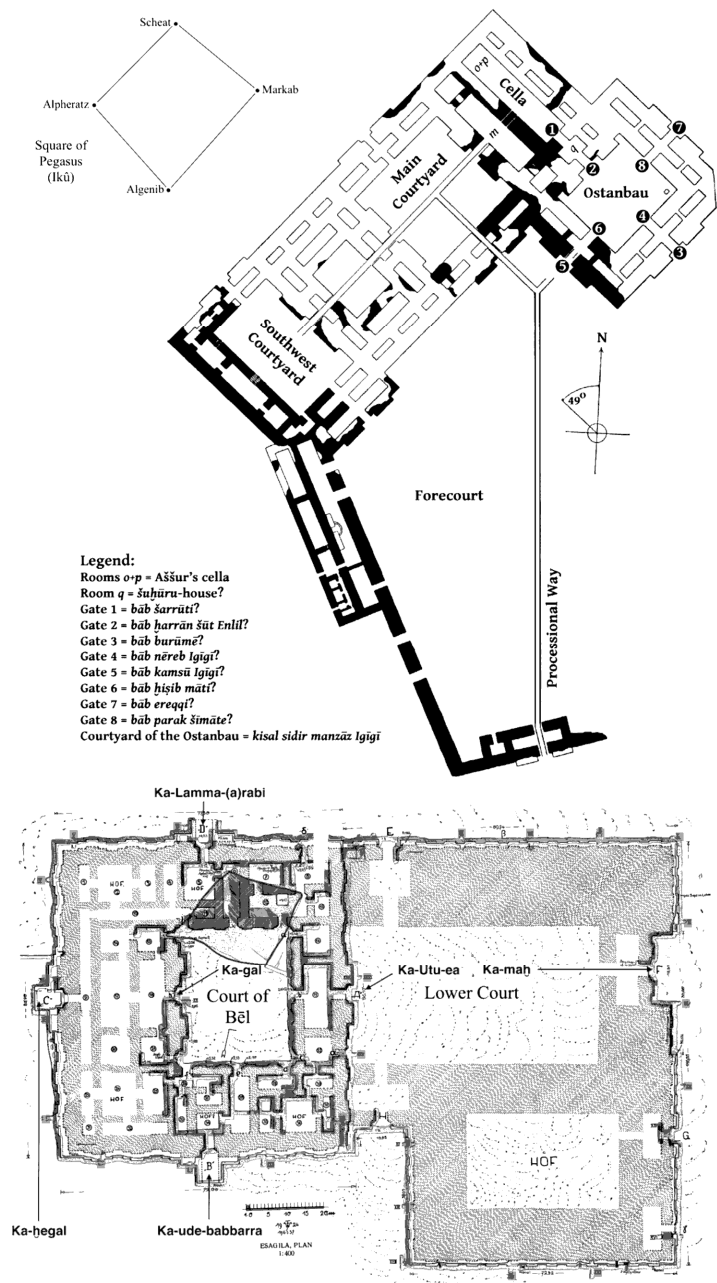


Fig. 1: Ešarra (top right), Esagil (bottom), and the ‘Square of Pegasus’ (*ikû*; top left). Adapted from Andrae 1977, 53, fig. 35; and Wetzel and Weissbach 1938, plate 3.

After Sennacherib's murder in 681 BCE, his son and immediate Esarhaddon almost immediately began reversing some of his father's religious reforms, presumably with the assistance of a disgruntled Aššur priesthood, men who might have been displeased with what Sennacherib had done between 688 and 681 BCE.¹¹ Most significantly, Esarhaddon began rebuilding Babylon and the Esagil temple complex, together with the nearby ziggurat Etemenanki.¹² While the brick structures of Babylon's holiest buildings were being constructed, important objects from Esagil, especially its cult statues, were being refurbished in a divinely-sanctioned workshop in Assur; divine approval, a positive response to a query addressed to the sun-god Šamaš, was received through extispicy.¹³ The process of returning the god Marduk and his property to Esagil in Babylon and making that temple once again the 'bond of heaven and earth' could not have been an easy task, especially because Sennacherib had significantly complicated matters by dedicating Marduk's possessions to Aššur, as well as by adding inscriptions on their decorative metal plating. Prayers, expressions of humility, and divination, in addition to other rites and rituals, were required at every stage of the process.¹⁴ Any misstep could anger the Assyrian national god and Esarhaddon, his advisors, and workmen did their best to ensure that the process of re-instituting the Marduk cult went as smoothly as humanly possible. This was especially important as objects originally belonging to Babylon's patron god were in the hands of the Assyrian national god. It is unknown how many pieces of cult furniture and paraphernalia Esarhaddon reappropriated during his reign, as this information is not recorded or preserved in presently-extant sources, but it is likely that he did retrieve the metal-plated pedestal upon which Marduk's statue stood. Although it is clear that at least two texts were added to it, it is unknown if Esarhaddon's workmen had to remove inscription(s) of his father from it before rededicating it to Marduk.

11 On Sennacherib's murder, see Grayson and Novotny 2014, 28–29 (with references to previous studies); Knapp 2020; Dalley and Siddall 2021; and Jones 2023.

12 Information about Esarhaddon's building activities are known principally from that king's so-called 'Babylon Inscriptions' and from letters. See in particular Parpola 1993, nos 24, 109, 111–112, 169, 253, 348, 354, 364, and 368; Cole and Machinist 1998, nos 161–164, 166, 168, 172–176, 178–181, and 190; Reynolds 2003, no. 14; and Leichty 2011, 191–258 Esar. 104–126. For studies, see in particular Streck 2002; Porter 2003; Novotny 2015; and Novotny, Jeffers and Frame 2023, 14–16.

13 Leichty 2011, 107 Esar. 48 lines 72b–79b. See n. 46 below for a translation of this passage. Making the divine statues suitable to be placed back on their daises in Babylon might have taken place during the final years of Esarhaddon's reign, perhaps between 672 and 669 BCE. However, this cannot be proven and the work could have begun earlier, c. 674 or 673 BCE. The task of rebuilding the structures of Babylon's temples and ziggurat, on the other hand, started much earlier, perhaps already in 678, eleven years after Sennacherib had sacked and destroyed Babylon.

14 For example, see Leichty 2011, 107 Esar. 48 line 65: 'I prayed to the divinity of the god Aššur, the king of the gods, and the great lord, the god Marduk, with raised hands, prayers, and expressions of humility'.

This is clear from scribal notes on two fragmentarily-preserved clay tablets (K 2388 and K 7862; see Fig. 2). The subscripts read respectively as ‘Written on the pedestal [of] the great lord, the god [Marduk]’; and ‘Written on the pedestal of (the statue of) the god Bēl (Marduk). [Like] its [origi]nal, written and collated. [Tablet (belonging to)] Marduk-šākin-šumi, the young apprentice (scribe). [Written by] Nabû-zēra-ikšur, scribe, [son of] Ina-tēši-ētir, scribe (and) descendant of Nabû-nāšir, scribe’. Both inscriptions seem to have been fairly lengthy. This is not a surprise given the available surface space on the pedestal.¹⁵

Despite Esarhaddon’s best efforts, and contrary to what his inscriptions record, work on Esagil remained unfinished and the refurbished statue of Marduk was still in Assyria when he died in late 669 BCE.¹⁶ The completion of that work fell to Ashurbanipal and Šamaš-šuma-ukīn, whom Esarhaddon had officially designated to replace him in early 672 BCE. Shortly after Ashurbanipal’s official coronation as the king of Assyria at the very beginning of 668 BCE, he travelled south to Babylon with his older brother Šamaš-šuma-ukīn, the statues of Marduk and his entourage (Zarpanītu, Bēlet-Bābili, Ea, and Mandānu), and numerous priests and temple personnel. Marduk’s statue and probably some of the possessions of Esagil reacquired by Esarhaddon – very likely the aforementioned pedestal – were returned and Šamaš-šuma-ukīn was placed on the throne, just as Esarhaddon had intended to do.¹⁷ As work in Babylon was still incomplete, Ashurbanipal, despite the fact that his brother was the king of Babylon, took it upon himself to finish what his father had started. He completed Esagil’s structure; adorned its interior, especially its cella; and roofed it with beams of cedar and cypress.¹⁸ Esagil, with

¹⁵ For editions of these two still-incomplete inscriptions, see Leichty 2011, 98–101 Esar. 44–45. Whether or not Sennacherib had inscription(s) added to Marduk’s pedestal is unknown since no tablet stating that it contains a copy of a text of Sennacherib from that object has yet been identified. The assumption that Marduk’s pedestal might have borne a text is based solely on the fact that Marduk’s bed and throne had inscriptions placed on them when they were dedicated to Aššur. See below for further details.

¹⁶ Several inscriptions of Esarhaddon prematurely record Marduk’s triumphant return to Esagil and the installation of Šamaš-šuma-ukīn as king of Babylon. See Leichty 2011, 113 Esar. 52 and Leichty 2011, 114–115 Esar. 53. For further details, see Novotny, Jeffers and Frame 2023, 16, n. 103.

¹⁷ For a recent overview of Ashurbanipal’s building activities at Babylon, see Novotny, Jeffers and Frame 2023, 16–21. Late in Nisannu (I) 668 BCE, Ashurbanipal instructed his diviners to determine whether Šamaš-šuma-ukīn should take the hand of Marduk during that year and take that god’s statue back to Babylon; see Starr 1990, 236–237, no. 262). On 28-I-668 BCE, the Assyrian king’s haruspices returned with a ‘firm yes’ from the gods Šamaš and Marduk and the journey to Babylon set out shortly thereafter. The return journey is described in the so-called ‘School Days Inscription’. For an edition of that passage, see Jeffers and Novotny 2023, 326–327 Asb. 220 iii 1’–22’.

¹⁸ For example, Novotny, Jeffers and Frame 2023, 50 Asb. 241 lines 14b–16a: ‘Moreover, I *decorated* Esagil with silver, gold, (and) precious stones and made Eumuša glisten like the stars (lit. “writing”) of

Marduk back in his cella, once again became a bond that connected the human and divine realms and its cult resumed for the first time since late 689 BCE.

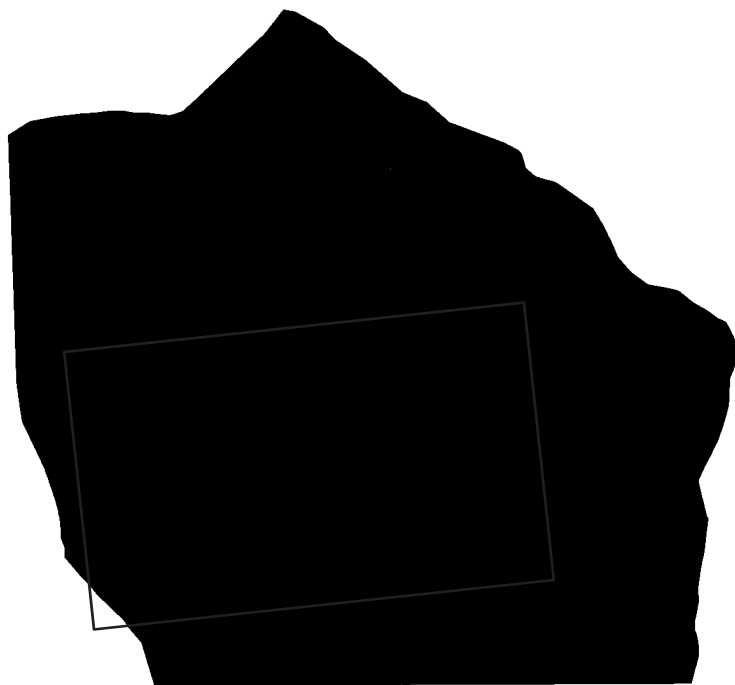


Fig. 2: Annotated photograph of K 7862, a fragment of a multi-column tablet bearing a copy of an inscription that Esarhaddon had placed on Marduk's (metal-plated) pedestal. © The Trustees of the British Museum. Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) license.

the firmament'; and Novotny, Jeffers and Frame 2023, 61 Asb. 246 lines 56–63a: 'Moreover, I completed the work on Esagil which my father had not finished. I roofed it with long beams of cedar and cypress, the produce of Mount Amanus and Mount Lebanon. I had doors made of boxwood, *musukkannu*-wood, juniper, and cedar and I fixed (them) [in] its gates'. Ashurbanipal's completion of Esagil's structure can be confirmed from numerous bricks with a nine-line Akkadian inscription found in Floor k (third pavement) and Floor l (fourth pavement). This work might have been due in part to the fact that Esarhaddon's architects had not sufficiently raised the temple above the water table and that Esagil's inadequately waterproofed floor needed to be fixed. Ashurbanipal's workmen raised the level of the temple's pavement by nearly a half meter. The wood was probably supplied by one or more of Assyria's vassals in the Levant. It is possible that Ba'alu of Tyre, Milki-ašapa of Byblos, Iakin-Lû (Ikki-lû) of Arwad, and Abi-Ba'al of Samsimurruna aided in the transport of the timber since Mount Amanus and Mount Lebanon were in their spheres of influence.

3 Extant evidence for Ashurbanipal erasing and rewriting texts

Although Marduk and many of his prized possessions were back in Esagil, Ashurbanipal continued from time to time to grapple with the aftermath of his grandfather Sennacherib's sack of Babylon and his subsequent transformation of the Aššur temple and cult. This is clear from a scribal note written on a multi-column clay tablet (K 2411; see Fig. 3) and from the entry in the so-called 'Šamaš-šuma-ukin Chronicle' for Ashurbanipal's fourteenth year (655 BCE).¹⁹ Both sources record that Marduk's pleasure bed was returned to its rightful place in Babylon.²⁰ One of the texts (K 2411) also states that that god's throne was also brought back to Esagil at the same time; the same might be true for an ornate chariot, but there is insufficient information about whether it was created anew by Ashurbanipal or if it was one of the cult objects brought to Assur by Sennacherib and, thus, little attention will be given to that project in this paper.²¹ Let us examine the situation in more detail.

¹⁹ Respectively Jeffers and Novotny 2023, 333 Asb. 223 iii 36'–40' (translated below); and Novotny and Jeffers 2018, 35: 'The fourteenth year: The former bed of the god Bēl (Marduk) came from [*Baltil* (*Aššur*)] to Babylon'. The date in the 'Šamaš-šuma-ukin Chronicle' conflicts with the scribal note written on K 2411 (= Asb. 223), which states that the bed was returned on the twenty-seventh day of Simānu (III) of the eponymy of Awiānu (655 BCE). The date of 655 can be confirmed from a second inscription of Ashurbanipal dated to the 'eponymy of Awiānu': Novotny and Jeffers 2018, 356 Asb. 61 rev. 24'–25'. Therefore, the fourteenth year mentioned in the 'Šamaš-šuma-ukin Chronicle' appears to be a mistake for the king of Babylon's thirteenth regnal year. However, if it refers to Ashurbanipal's fourteenth year, then the date is correct. For comments on the confusion of dates in Babylonian chronicles, see Novotny, Jeffers and Frame 2023, 20, n. 126.

²⁰ According to numerous other inscriptions, this bed was placed in 'Kaḫilisu, the bed chamber of the goddess Zarpanītu, which is laden with sexual charms'. See, for example, Novotny and Jeffers 2018, 216 Asb. 10 i 52–54. Kaḫilisu is a byname of Eḫalanki ('House of the Secrets of Heaven and Netherworld') and named in Ashurbanipal's inscriptions instead of Edara'ana ('House of the Ibex of Heaven'), the actual name of the cella of Zarpanītu in Esagil.

²¹ The 'Šamaš-šuma-ukin Chronicle' (Novotny and Jeffers 2018, 35 [entry for the fifteenth year]) records that the chariot was new, however, this is less certain from Ashurbanipal's own inscriptions, which vaguely state the following: '(As for) the exalted chariot, the vehicle of the god Marduk, the pre-eminent one among the gods, the lord of lords, I completed its feature(s) with gold, silver, (and) precious stones. I gave (it) as a gift to the god Marduk, the king of the totality of heaven and netherworld, the one who overwhelms my enemies'. See, for example, Novotny and Jeffers 2018, 216 Asb. 10 i 39–45. The vagueness of the description does not rule out the possibility that the chariot was an existing object that had been brought back to Assur when Sennacherib destroyed Babylon and Esagil in 689 BCE. Compare the description of the refurbished pleasure bed below, which seems to suggest that Ashurbanipal's workmen made that ornate object anew, rather than refurbishing it. A fragmentarily-

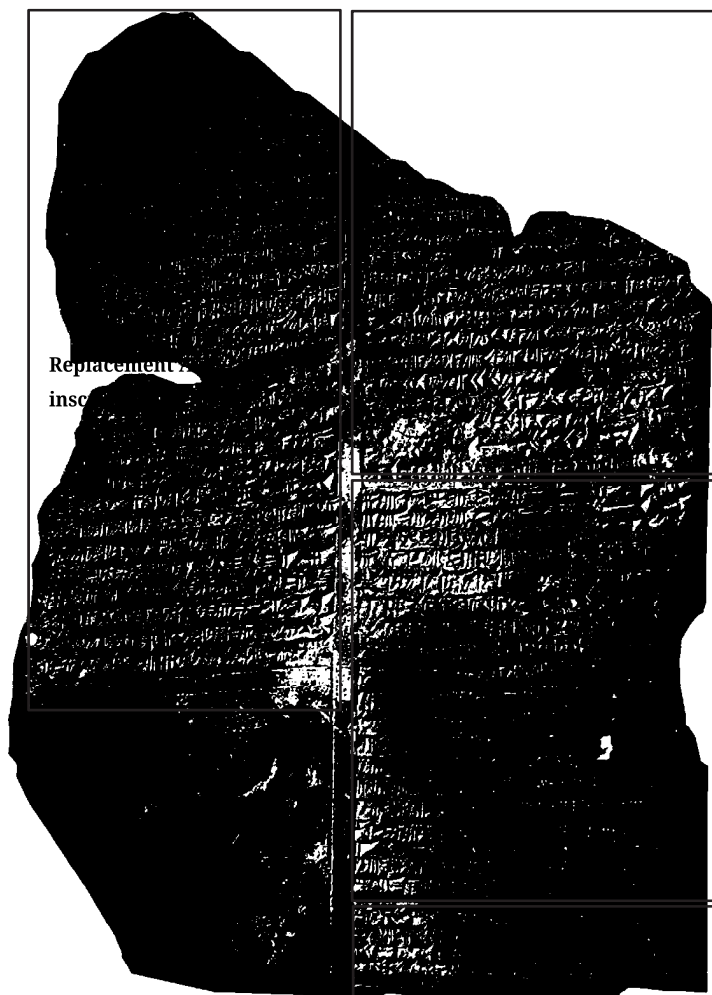


Fig. 3: Annotated photograph of the reverse of K 2411, a badly-preserved multi-column tablet containing a copy of the Sennacherib inscription(s) that Ashurbanipal's workmen had removed from Marduk's bed and throne, detail descriptions of those two cult objects, a scribal note providing some context to the situation, and a copy of the replacement text of Ashurbanipal placed on the substantially refurbished bed and throne. © The Trustees of the British Museum. Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) license.

preserved bilingual Sumerian-Akkadian text describing Marduk's chariot (K 9008 + 83-1-18,141), which could date to the Second Dynasty of Isin, might provide proof that that object existed long before the seventh century. For a study and edition of that text, see Lambert 1973, 275–279.

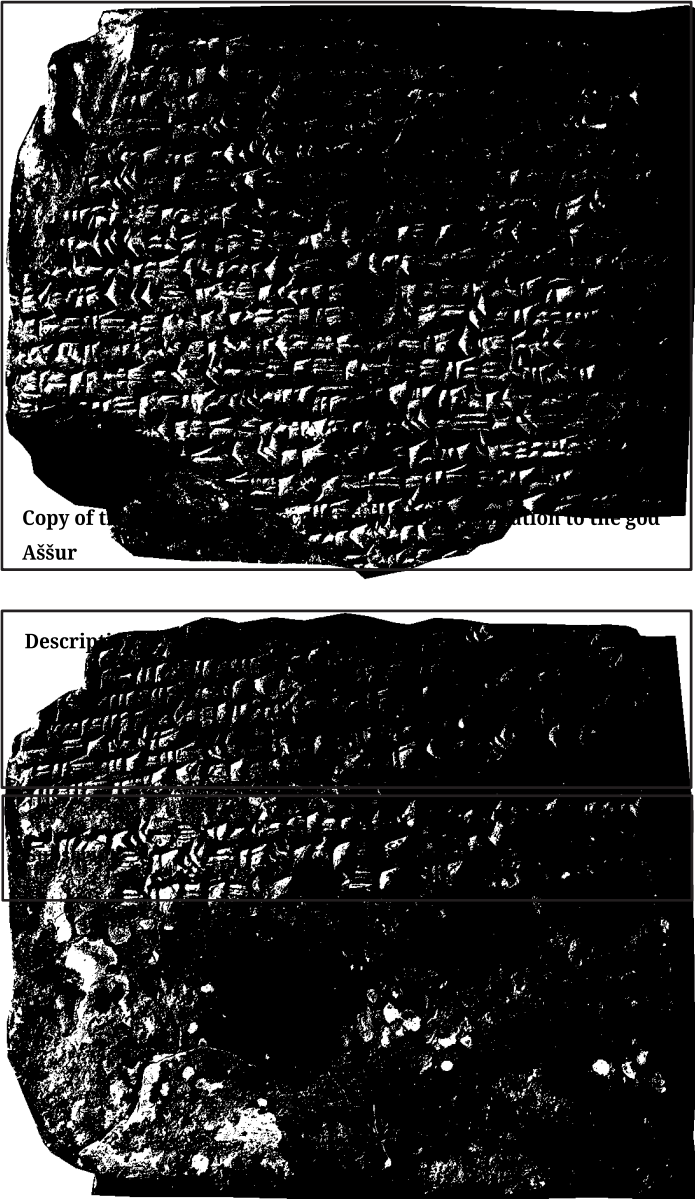


Fig. 4: Annotated photograph of the obverse and reverse of K 8664, a fragmentary single-column tablet containing a copy of an inscription of Sennacherib that Ashurbanipal's workmen had removed from Marduk's bed and throne, together with detail descriptions of those two cult objects. © The Trustees of the British Museum. Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) license.

Fourteen presently-known inscriptions record that Ashurbanipal worked on Marduk's pleasure bed, while none currently make any mention of the restoration of that god's throne. The latter cult object, Marduk's throne, is known only from references to it in two scribal notes on clay tablets (K 2411, see Fig. 3, and K 8664, see Fig. 4).²² As for the bed, according to K 2411, looked as follows before Ashurbanipal had it completely renovated:

The length of the sideboard is six and two-thirds cubits, measured by the royal cubit. The frontpiece is three and one-third cubits, measured by the royal cubit. (There are) twelve gold platings on the side of the bed; six ditto (= gold platings) on the side. (There is) a ... *mušḫuššu*-dragon on top of the sidewalls. The mattress (has) a *nalbattu*-form that has [...] ... of *pa[ppardilū]*-stones, (and) *ḥašhur-api* (ornaments) of obsidian, carnelian, (and) lapis-lazuli arranged around (it). The lower mattress is gold (and) water is ... on (it). The legs are *lamassu*-figures. Beneath the *lamassu*-figures a [...] claw(-shaped ornament). There are eight *lamassu*-figures on the two rungs of the sid[es]. (There is) one *lamassu*-figure on each ... [(...)]. Water surrounds *lamassu*-figures The rungs are ... with water. The leg(s) of the be[d] are one and two-thirds cubits, measured by the royal cubit.²³

Ashurbanipal's 'canonical' description of the renovation work on Marduk's pleasure bed reads as follows:

I skilfully made a bed of *musukkannu*-wood, a durable wood, that is clad with *pašallu*-gold (and) studded with precious stones, as a pleasure bed for the god Bēl (Marduk) (and) the goddess Bēltiya (Zarpanītu) to carry out the wedding (and) to make love. I placed (it) in Kaḫilisu, the bed chamber of the goddess Zarpanītu, which is laden with sexual charm.²⁴

The 'standard' description of the renovation of the bed, which is known from texts composed between 655 and 638 BCE, does not refer to the fact that the Ashurbanipal's workmen simply renovated the bed that Sennacherib had removed from Esagil in 689 BCE and had placed in the Ešarra temple in Assur, but rather seems to

²² Grayson and Novotny 2014, 228 Senn. 161 rev. 9'–11': 'Wording (of the inscription) that (is) on the bed (and) the throne at the footend. *It is a single (text)*. That of the chest was not copied'; and Jeffers and Novotny 2023, 333 Asb. 223 iii 36'–40' (= Grayson and Novotny 2014, 231 Senn. 162). See below for a translation of the second passage. According to K 2411 (Grayson and Novotny 2014, 231 Senn. 162 iii 30'–35'), the throne looked as follows: 'The length of the thr[one] is three and one-thirds cubits, measured by the royal cubit. Its width is one and two-thirds cubits. Water surround[s] *lamassu*-figures. There are four *lamassu*-figures on the two rungs of the sides; two ditto (= *lamassu*-figure) on the frontpiece. The entire throne: The length of the *kitturru* is one and two-thirds cubits. (Its) height is two-thirds of a cubit. The width of the *kuptu*, as far as the *mušḫuššu*-dragon, is two-thirds of a cubit'.

²³ Grayson and Novotny 2014, 231 Senn. 162 iii 17'–29'.

²⁴ Novotny and Jeffers 2018, 216 Asb. 10 i 46–54.

suggest that it had been newly made and ornately decorated. As one expects from an Assyrian inscription, no mention is made of an inscription being written on the bed's new gold-alloy plating. This is clear only from the copy of that text written on K 2411 (and on K 8664). The entry for the 'fourteenth year' in the 'Šamaš-šum-ukin Chronicle' not only records that this object was sent from Assur (from the sacred Baltil district) to Babylon, but also states that the bed had existed previously, thus, making it clear that Ashurbanipal's workmen had not created a new piece of furniture for Babylon's divine patron, but rather renovated the existing one in 656 BCE, or at the very beginning of 655 BCE at the latest.²⁵ In addition, more detailed information is provided by a short scribal note written on a multi-column clay tablet that was probably inscribed in 655 BCE, Ashurbanipal's fourteenth regnal year, when the Assyrian king was made aware of the fact that several objects of Marduk were still in the Aššur temple in Assur. That notation reads as follows:

Wording (of the inscription) that was erased from the bed (and) the throne of the god Bēl (Marduk), which were deposited in the temple of (the god) Aššur, (and that of the inscription) written upon (them) in the name of Ashurbanipal. Simānu (III), the twenty-seventh day, eponymy of Awīānu (655), th[ey were returned t]o Ba[byl]on [...].²⁶

Not only does the note record the exact date that the bed was returned to Esagil, but it also explicitly states that Marduk's bed, in addition to his throne, both of which were in Aššur's temple, had earlier inscriptions on them.²⁷ Those texts were erased by Ashurbanipal's workmen and then replaced with Ashurbanipal's own inscription. That text, as far as it is preserved, reads as follows:

[...] ... [...] ... [...], O l]ord, being furious (and) relenting, [*destroying* (and) c]reating, (and) depopulating (and) (re)populating (regions) [are] in your hands. (As for) Esagil, the terrifying cella, the seat of [your] supreme pow[er, *you command*ed your beloved king to restore you[r] divine work. I, Ashurbanipal, king of Assyria, your pious servant; [son of E]sarhad-don, king of Assyria; (grand)son of Sennacherib, king of Assyria; [who reve]res the command of your great divinity, who is assiduous towards your places (of worship) and your daises, who carries out in full your cultic rites, (and) who placates your mood: I completed [Esa]gil. I decorated the replica of the *apsū*, the palace of your lordly majesty, with [g]old, making (it) shine like daylight. [I mad]e the exalted chariot of the king of the gods (Marduk), the vehicle of the lord of lords. [*I skilfully made* a bed of] [m]usukkannu-[wo]od, a durable wood, (as) a pleasure bed, [that is c]lad with [*pašallu*-gold] (and) studded with precious stones, [...] whose

²⁵ See n. 19 above.

²⁶ Jeffers and Novotny 2023, 333 Asb. 223 iii 36'–40' (= Grayson and Novotny 2014, 231 Senn. 162).

²⁷ According to the scribal note on K 8664 (Grayson and Novotny 2014, 228 Senn. 161 rev. 9'–11' [translated above in n. 22]), the bed had two inscriptions written on it. One text was also written on Marduk's throne (on the footend).

sid[e]s are surrounded with [...] ... [...] it was truly set up [fo]r the god Marduk (and) the goddess Zarpanītu, the de[iti]es who l[ove] each other. [To *preserve*] my [li]fe (and) prolong my days, I presented (these objects) as a gift (to them). [When] they perform [the m]arriage rites (and) enter the house of lovemaking, may both gods speak about my [...] to each other, (and) may they bless my kingship [with] their holy [p]ronouncement(s), which cannot be altered. May they let me, the one who is assiduous towards their places (of worship), achieve my heart's [d]esire. May they flatten my enemies (for me), the one who fulfils their heart's wish. [(But) as for the one who] erases my inscribed name and writes his (own) name, (or) effaces (and) destroys [the m]ention of the king who is assiduous towards the sanctuaries of the god Marduk (and) the goddess Zarpanītu by any crafty device that there is, may the god Marduk, king of the gods, take away his libido (and) make his seed disappear, (and) may the goddess Zarpanītu speak evil about him in the bedroom, the (private) room of the head of the family.²⁸

Although clay tablet K 2411 is damaged, especially its obverse, the copy of the pre-Ashurbanipal text(s) is sufficiently preserved to be able to determine that the inscription(s) on the bed and throne were put there by Sennacherib, as he is mentioned by name, and that those objects had been dedicated to the god Aššur. The preserved portions of Sennacherib's inscription(s) written on K 2411 read as follows:

[... t]o my land [...] ... [...] (long lacuna) [... I ...] to (the god) Aššur, *king of [the gods, ... for (...)]* the securing of my reign, the increasing of [...], ..., [...] the foundation of my throne for [...] days. May (the god) Aššur, king of the gods, the great god, ... look kindly up[on] my [de]eds. When he looks, may the works that are the desire of [...], as much I ha[ve] do[n]e, please him and be acceptable to him. May he make the people of the four quarters (of the world) bow down to him so that they pull his yoke. May he make the substantial tribute of the settlements, the abundance of heaven (and) earth, pour into Ešarra, the seat of his great divinity, annually. May the goddess Mullissu, the queen of Ešarra, the consort of (the god) Aššur, creator of the great gods, have a good word about Sennacherib, king of Assyria, set upon her lips daily before (the god) Aššur. May (the god) Aššur and the goddess Mullissu discuss [the ... of po]wer, the attainment of very old age, the lengthening of his (Sennacherib's) days, the securing of his reign, (and) the ... of the throne of his kingship forever and ever.²⁹

The transfer of ownership from Marduk to Aššur is confirmed by a second clay tablet (K 8664), which preserves a portion of the opening dedication to the Assyrian national god.³⁰ The scribal notation on that badly-damaged tablet records that the bed and throne bore one and the same dedicatory inscription, as well as not-

²⁸ Jeffers and Novotny 2023, 333–334 Asb. 223 iv 1'–29'.

²⁹ Grayson and Novotny 2014, 229–231 Senn. 162 ii 1–iii 16'. For a translation of the opening dedication, which is preserved on K 8664, see above.

³⁰ See above.

ing that the throne had a second inscription written on it.³¹ K 2411, the tablet that included the replacement text of Ashurbanipal for Marduk, presumably had both Sennacherib texts copied on it. The scribes (faithfully) copied the texts not only out of respect for Ashurbanipal's grandfather, but also because it was important since it was common knowledge that erasing, removing, and/or altering inscriptions from objects, especially those belonging to the gods, could anger the gods, who would then exact terrible revenge for the transgression. Preparing a copy of the former inscription and storing it in a safe place appears to have been a loophole that allowed one text to be removed and replaced by another and, thereby, exempt from impending divine retribution. Presumably, the whole process was accompanied by prayers, rituals, and extispicy. Matters, of course, were complicated by the fact the objects in question belonged to Aššur and were housed in his temple. As the bed and throne originally belonged to the tutelary god of Babylon and because the local priesthood might have been in favour of removing any object formerly belonging to Marduk from Ešarra, Ashurbanipal probably had little trouble reappropriating Marduk's possessions, at least from the human agents involved in the matter. Unfortunately, Ashurbanipal's inscriptions do not provide any insight into the process, including exactly how his grandfather's inscriptions were 'erased'. Based on the extremely vague details given in the inscriptions themselves, which suggest that the bed had been significantly renovated, one might surmise that the inscribed metal plating was entirely removed and replaced by a new metal covering, rather than having its inscribed area erased and then reinscribed with a replacement text. This supposition is likely supported by the fact that the scribes who copied Sennacherib's inscriptions onto clay tablets recorded numerous details about the size, structure, and decoration of the bed and throne in order that the renovated and Ashurbanipal-inscription bearing object looked as close as possible, if not identical, to the originals, minus Sennacherib's inscriptions dedicated to Aššur.³² If this proposal proves correct, then it is not impossible that the metal coverings bearing Ashurbanipal's grandfather's texts were not destroyed, but kept for posterity (see below). This would have further ensured that no divine wrath occurred due to the removal of a royally commissioned text. Exactly where and how the removed metal would have been stored is not clear.

It is possible that Marduk's chariot underwent a similar process before making its way into Esagil in 655 BCE. Given the available information in the extant

31 See n. 22 above. The second inscription was placed on the chest of the object. That text was not on copied onto K 8664.

32 For translations of these passages, see above, as well as n. 22.

textual record, it is unclear whether Ashurbanipal's workmen heavily refurbished an existing and dilapidating object or if they created an entirely new one.³³ Based on one fragmentarily-preserved contemporary inscription (EŠ 6699 = Ass 900+), the former scenario might have been the more likely of the two. The relevant passage of that text reads

At that time, the *trap[pil]ngs* of the exalted chariot of [*the king of the god(s) (Marduk)*], the v[ehicle of] the lord of lo<rd>s, (and) a bed of *mus[ukkan]u*-wood, a [du]rable wo[od], that is cla[d] with gold [...] as a bed for the god(dess) [...] (*the god*) *Aššur* [and] the god(dess) [...] my [...].³⁴

This inscription gives the impression that Marduk's chariot, just like the pleasure bed, existed prior to Ashurbanipal's reign. This might explain why most of Ashurbanipal's texts just refer to the lavish decoration of that cult object rather than its construction and subsequent decoration. Moreover, this passage in EŠ 6699 (Ass 900+) also seems to infer that it had been dedicated to the Assyrian national god and, thus, it is not impossible that Ashurbanipal replaced an inscription of Sennacherib with one of his own on that chariot's metal decoration. Because it is said to have been in a deplorable state, it is not unlikely that the 'renovated' chariot looked significantly different and, thus, was seen by the Babylonians as a 'new chariot', as the 'Šamaš-šuma-ukīn Chronicle' records.³⁵

Thanks to two short, yet informative scribal notes, as well as a laconic entry in a Babylonian chronographic text, we have some insight into Ashurbanipal 'erasing' or removing inscriptions of one of his immediate predecessors and replacing those texts with ones of his own. Unfortunately, no contemporary details about the complex process involved are recorded or preserved. Based on information given in at least one text composed while his father Esarhaddon was king, it can be assumed that divine approval in the form of a 'firm yes' (Akkadian *annu kēnu*) through extispicy was regularly obtained to ensure that neither Aššur nor Marduk was angered as the metal-plated objects were removed from Ešarra, had their old inscriptions removed, were renovated and had replacement texts added

³³ See n. 21 above.

³⁴ Novotny and Jeffers 2018, 355 Asb. 61 obv. 27b–33. On the chariot, see n. 21 above.

³⁵ For a translation of the 'canonical' description of Ashurbanipal's work on Marduk's chariot, see n. 21 above. K 2411 (Jeffers and Novotny 2023, 333–234 Asb. 223) also gives the impression that Marduk's chariot was built anew. The relevant line (iv 13') reads '[I mad]e the exalted chariot of the king of the gods (Marduk), the vehicle of the lord of lords'. Note that Ashurbanipal also infers that he made Marduk's pleasure bed anew, when it is clear that that object was extensively refurbished and not an entirely new creation. See above, for a text which might provide evidence that the chariot was not newly fashioned by Ashurbanipal.

to them, and were placed once again in Esagil. As inscribed metal and metal-plated objects were regularly repaired and renovated in Assyrian temples, Ashurbanipal's advisors and workmen would have been well accustomed to the protocols involved in such delicate work. Surely, the actions of Assyria's last great king did not break or deviate from tradition when it came to handling older inscribed objects. However, the circumstances leading up to him replacing inscriptions of his grandfather written on behalf of Aššur with his own texts composed for Marduk is not, since this could have happened only while he and his father Esarhaddon sat on the Assyrian throne.

4 Following the footsteps of Sennacherib and Esarhaddon

A careful review of the presently-extant and published texts reveals that Ashurbanipal's treatment of older inscriptions, especially those written on the metal plating of cult objects, was not at all unusual. There is some evidence that demonstrates that his grandfather and father also added new texts to important objects, including those belonging to the gods, thus making it sufficiently clear that Ashurbanipal followed in the footsteps of his (immediate) predecessors.

Sennacherib's own inscriptions provide very few details about the fate of the cult statues and cult items after the fall of Babylon in late 689 BCE. Two texts state that Babylon's gods were damaged, while one records that the Assyrian troops took the possessions and property of that city's temples for themselves.³⁶ It is clear from later sources, as mentioned above, that some of the most important objects from those religious institutions made their way into Ešarra, the most important temple of the Assyrian Empire. Scribal notes written on two clay tablets record that Sennacherib had inscriptions written on the metal plating of at least two of Marduk's cult objects: his pleasure bed and throne (as described in the previous section). The throne, which had one text written on its footend and one on its chest, and the bed, which was engraved with only one inscription – the same one that was written on the throne's footend – were rededicated to Aššur.³⁷ This is evident from the opening dedication of the inscription, which is partially preserved on one of the tablets (K 8664) on which Ashurbanipal's scribes had the

³⁶ Grayson and Novotny 2012, 205–206 Senn. 24 vi 1'–16'; and Grayson and Novotny 2014, 316–317 Senn. 223 lines 47–54a.

³⁷ For further information, see n. 22.

original inscription copied before it was removed from the throne and bed.³⁸ It is unknown at this time whether or not Sennacherib had his scribes copy and remove earlier inscriptions from those two objects, should they have borne texts. Undoubtedly, this would have certainly been the case had those pieces had a dedicatory text addressed to Marduk on them. Presumably, other important pieces of property looted from Esagil and Babylon received similar treatment. For example, Sennacherib had a short inscription added to a royal seal of the Kassite king Šagarakti-Šuriaš (r. 1245–1233 BCE), which the Middle Assyrian king Tukulti-Ninurta I (r. 1243–1207 BCE) had ‘600 years earlier’ also taken from Babylon and engraved with his own inscription. In this instance, Sennacherib’s behaviour was modelled on a much earlier Assyrian king (Tukulti-Ninurta I), one who also destroyed Babylon. All of the inscriptions on that now-lost lapis lazuli seal were written down on a clay tablet (K 2673).³⁹ The original seal had ‘Property of Šagarakti-Šuriaš, king of the world’ written on it. When Tukulti-Ninurta I took it as booty from Babylon, he had the following added to this large lapis lazuli seal:

Tukulti-Ninurta (I), king of the world, son of Shalmaneser (I), king of Assyria: Booty of Karduniaš (Babylonia). As for the one who removes my inscription (and) my name, may (the god) Aššur (and) the god Adad make his name disappear from the land.

The seal was returned to Babylon and was then taken back to Assyria by Sennacherib in 689 BCE. He then added his own inscription, which read:

This seal was given as a gift from Assyria to Akkad. I, Sennacherib, king of Assyria, after six hundred years conquered Babylon and took it out from the property of Babylon.

It is clear from the scribal note at the end of this clay tablet, that the three inscriptions included on K 2673 were from a seal made of lapis lazuli. Although the seal is now lost, it must have been a rather large seal given the fact that it had three inscriptions (totalling forty-seven words) written on it. Compare the ‘Adad Seal’ rededicated to Marduk by Esarhaddon (see Fig. 5 below), which measures 15.5 cm in length and 3.2 cm in diameter.

³⁸ For a translation of the opening dedication, see above.

³⁹ Grayson and Novotny 2014, 215–217 Senn. 156.

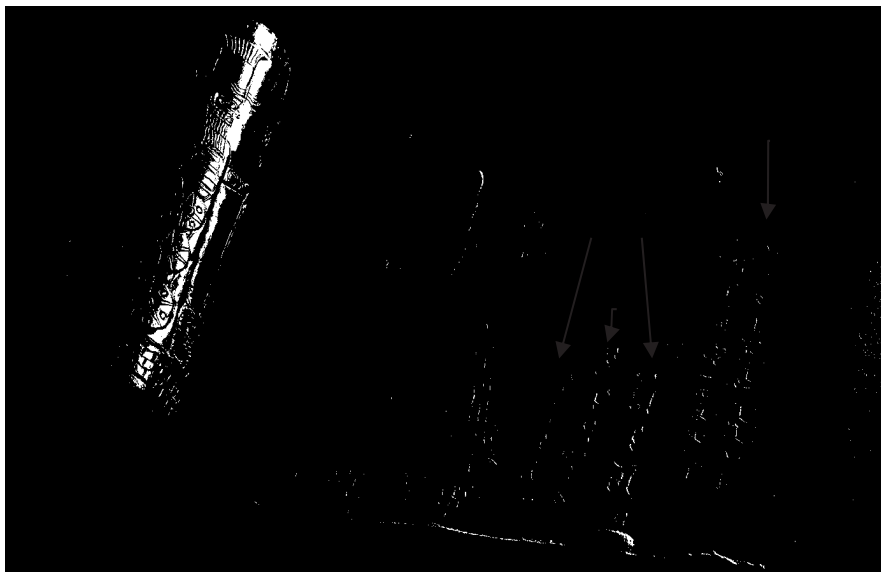


Fig. 5: Annotated photograph of Esar. 118 = VA Bab. 647, a monumental lapis lazuli cylinder seal from Babylon that has three Akkadian inscriptions engraved upon it. © Vorderasiatisches Museum, Staatliche Museen zu Berlin. Photo: Olaf M. Teßmer. Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) license.

Šagarakti-Šuriaš's seal might not have been the only seal taken from Babylon in 689 BCE. The seal of the storm-god Adad was possibly taken to Assyria at the same time. Esarhaddon, Sennacherib's son and immediate successor, had a short, fourteen-word inscription added to that large lapis lazuli seal before it was rededicated to Marduk:

To the god Marduk, great lord, his lord: Esarhaddon, king of the world, king of Assyria, presented (this object) for the sake of his life.⁴⁰

Because Esarhaddon died before his work on Esagil was completed, the seal was probably returned in early 668 BCE, when construction of Babylon's most holy

⁴⁰ Leichty 2011, 248–249 Esar. 118 (with fig. 16). This seal also has three texts written on it. The first reads 'The seal of the god Adad of Esagil', while the second and third, which were later added read respectively as 'Property of the god Marduk' and 'To the god Marduk, great lord, his lord: Esarhaddon, king of the world, king of Assyria, presented (this object) for the sake of his life'. For further information on how the texts were inscribed, see Leichty 2011, 248 (with references to earlier literature).

temple was completed and when the statue of Marduk, together with other divine images, were returned to the Esagil temple complex.⁴¹ Esarhaddon appears to have been informed about the location of cult items taken from Babylon: the most important pieces seem to have been in Ešarra since they had been rededicated to Aššur as part of Sennacherib's transformation of the cult of the Assyrian national god between 688 and 681 BCE. The local priesthood might have been keenly aware of which objects of Babylon's tutelary deity then belonged to Aššur and they might have been happy to inform Esarhaddon, who was in the process of rebuilding Babylon's temples, which pieces of cult furniture and paraphernalia should be removed from Ešarra and returned to Esagil. The process appears to have begun fairly late in Esarhaddon's eleven-year reign, probably sometime between 672 and 669 BCE (although an earlier date, perhaps 674–673 BCE, cannot be ruled out), when work on rebuilding Esagil was closer to completion and the king was starting to plan Marduk's return. One such item might have been the metal-plated pedestal upon which Babylon's tutelary deity stood. Two clay tablets (K 2388 and K 7862) preserve parts of at least two different inscriptions that would have been written on that important item.⁴² It is unknown from the scribal notes on those tablets, however, whether or not this pedestal had been twice reinscribed and rededicated in the seventh century – first by Sennacherib for Aššur and second by Esarhaddon for Marduk, the object's original and rightful owner – or whether it had been fashioned anew by Esarhaddon. Given the complete lack of information, it is impossible to know which scenario actually transpired. Because it is known that some important cult objects of Marduk were rededicated to Aššur when Sennacherib made the Assyrian national god 'the new Marduk', it is not implausible that the pedestal in question was treated in the same manner as that deity's bed and throne. Specifically, Esarhaddon had to appropriate it from the Ešarra temple and remove the (dedicatory) inscription(s) that Sennacherib had written on it when he gave it as a gift to Aššur before he could add new inscriptions to its metal plating. Esarhaddon died before work on Esagil was completed and Marduk's statue was returned and, therefore, the task of returning the pedestal to Babylon fell to his son Ashurbanipal.

This proposed scenario might be supported by the fact that Esarhaddon also had a dais of Aššur, the so-called 'Dais of Destinies', rebuilt and replated with a new (inscribed and) decorated metal casing. The text in question, which is written on a stone tablet (as well as on a clay tablet), clearly states that the Assyrian king

⁴¹ See n. 17.

⁴² See n. 15 for further information.

replaced the old *zaḥalû*-metal covering with a new one made from *ešmarû*-metal, a different type of metal alloy. The relevant passage reads

The dais of destiny, the lofty dais on which the god Aššur lives (and) where they (the gods) decree the destiny of heaven and netherworld, which the kings, my ancestors, had made of baked bricks and covered with *zaḥalû*-silver, I (now) had (it) skilfully made of 180 talents of [ca]st *ešmarû*-silver. I fashioned on it (the dais) my royal image (shown) praying to their divinity (and) imploring (them) constantly to give me life, and an image of Ashurbanipal, my crown prince.⁴³

The identity of the last king to have encased that dais' baked-brick core in metal is not recorded. However, because Sennacherib worked on the 'Dais of Destinies' as part of his work on the Aššur temple, the metal plating that Esarhaddon had removed was probably the one put there by his father. An inscribed fragment of the bronze plating of an object (very possibly a dais) now in the British Museum in London might have been used to encase the holy 'Dais of Destinies'.⁴⁴ Rather than have the old inscription and decorations erased, which might have been too complicated as the new casing was to also be accompanied by new representations of the king and his heir designate Ashurbanipal, the old metal plating was simply removed. Due to the holiness of the object, Sennacherib's plating for the 'Dais of Destinies' was not destroyed and it was stored for posterity. Whether this followed or deviated from standard procedure is not at all clear from the textual and archaeological records. It is clear, on the other hand, that Neo-Babylonian kings regularly changed the metal plating of daises in Babylon and Borsippa, thus, demonstrating that seventh-century Assyrian kings were not an exception to the rule.⁴⁵

⁴³ Leichty 2011, 136 Esar. 60 lines 26'–29'a.

⁴⁴ Grayson and Novotny 2014, 273–274 Senn. 194. BM 91157 is a fragment of the bronze plating of an object (possibly part of the 'Dais of Destinies') made for the god Aššur sometime between 688 and 681 BCE. It is not impossible, although it cannot be proven with certainty, that it was the metal covering of that Esarhaddon had removed when he had the 'Dais of Destinies' replated during the final years of his reign (between 672 and 669 BCE).

⁴⁵ This is clear from inscriptions of Nebuchadnezzar II (r. 604–562 BCE) and Neriglissar (r. 559–556 BCE), who refurbished the Marduk's 'Dais of Destiny' at Babylon and Nabû's at Borsippa. With regard to the dais at Babylon, see, for example, Novotny and Weiershäuser 2024, 84 Nbk. 2 ii 54–iii 14. As for the dais at Borsippa, see, for example, Novotny and Weiershäuser 2024, 188 Nbk. 32 ii 9–11; and Weiershäuser and Novotny 2020, 44–45 Ner. 3 i 30–40. These daises had been plated previously by Esarhaddon and Ashurbanipal. These two Assyrian kings are presumably the unnamed rulers referred to in these Neo-Babylonian inscriptions.

5 Conclusions

Based on presently-available evidence, it is clear that Ashurbanipal's treatment of older inscriptions was not out of the ordinary. As far as it is possible to tell from the snippets of information preserved, some of which is known from clay tablets presumably found at Nineveh, Assyria's last great king followed in the footsteps of his predecessors, including his father Esarhaddon and his grandfather Sennacherib. Although Ashurbanipal erased or removed inscriptions of Sennacherib from important cult objects housed in the temple of Assyria's national god, he showed his grandfather a great deal of respect by having his scribes copy the inscriptions on clay tablets so that those texts would be remembered long after the originals had been destroyed or stored in a different place. The appropriation and alteration of these prized possessions of the great gods must have involved a great deal of tact. Despite the fact that the Aššur priesthood might very well have been happy to rid Ešarra of Marduk's property, everyone involved in the process of transitioning these important cult objects back to Babylon's tutelary deity had to tread carefully in order to avoid angering Aššur. Undoubtedly, divine confirmation through extispicy would have been required at each and every step, including ensuring that the right craftsman in the right workshop undertook this delicate and religiously-complicated task. Presumably, the job fell to a workshop in Baltil, in the city of Assur.⁴⁶ In the end, Ashurbanipal was able to return Marduk's cultic furniture and paraphernalia to their rightful place in Esagil. To ensure the happiness of these objects' original owner, the inscriptions that Sennacherib had written on them were erased or removed and replaced with new and appropriate ones. Although his grandfather's inscriptions were gone, Ashurbanipal made sure they were not forgotten.

⁴⁶ This suggestion/assumption is based solely on the fact that an inscription of Esarhaddon records that other objects from Esagil (including Marduk's statue) were refurbished, repaired, or created anew in a workshop located in Assur. The relevant passage of that text (Leichty 2011 Esar. 48 lines 72b–77a) reads 'I kneeled reverently (seeking) the judgment of the gods Šamaš and Adad, and I stationed diviners to (ascertain) their true decisions. I had an extispicy performed concerning (the selection of the) use of the workshop in Baltil (Assur), Babylon, or Nineveh, and I placed (before the diviners) separate lists of craftsmen who should do the work and be allowed to enter the secret place. The omens were unanimous: they answered me with a firm "yes", (and) told me (it should be) in Baltil (Aššur), (my) dynastic city, the residence of the father of the gods, the god Aššur. They indicated to me the workshop to use (and) the craftsmen to perform the work'.

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Refill, Reuse, Recycle? Reusing Wax Tablets in the Roman North-western Provinces

Abstract: Roman wax tablets were easy to reuse but also rigid and sealable, making them suitable for a wide range of text types from ephemeral drafts to lasting legal documents. Individual tablets moved between these two spheres when they were reused for different purposes. This chapter explores this versatility through the ways in which reuse manifests in tablet finds from the Roman north-west, through the superimposed texts they preserve but also through the tablets' morphology. Such evidence of reuse can help us trace the different roles Roman wax tablets played, tell us about challenges faced and solutions found by those who used and reused them, and reveal the motivations for reusing this medium in Roman everyday writing.

1 Introduction

In one of his elegies, the Augustan poet Propertius laments the loss of his writing tablets:

So, my clever writing tablets are lost, then, and so are many good texts! [...] They knew how to appease girls without me, and how to speak eloquently without me. [...] Argh! Now some miser writes his accounts on them and puts them with his stupid ledgers!¹

Nothing less than gold shall be the finder's reward, he continues, and tasks a slave with putting up a public notice including his address so that the tablets may be found and returned.² Propertius exaggerates, but he does so to make a point: to him, the tablets are more than a medium for writing; they are his proxies, an

1 Propertius 3.23.1–20, my translation (*Ergo tam doctae nobis periire tabellae, / scripta quibus pariter tot periire bona! / [...] / illae iam sine me norant placare puellas, / et quaedam sine me verba diserta loqui. / [...] / me miserum, his aliquis rationem scribit avarus / et ponit duras inter ephemeridas!*).

2 Propertius 3.23.21–24.

extension of his self – and now they may be abused for something as mundane as accounts.³

The tablets Propertius refers to are stylus tablets (*tabulae ceratae*): wooden tablets about the size of a postcard with recesses that were filled with wax and inscribed with a stylus. Thousands of these tablets have been found in the Roman north-western provinces and Italy alone, where they usually survive in very moist soil in an anaerobic environment or – in the case of the Campanian tablets – were preserved by the eruption of Mount Vesuvius.⁴ While the wax layer is usually lost, traces of writing are sometimes preserved where the stylus scratched into the wooden surface underneath the wax layer or where texts were inscribed directly into the wood.

Wax tablets were essential to Roman everyday writing in the north-western provinces. Their convenient size and rigidity, the fact that tablets could be tied together in bundles (*codices*) and sealed, and the wax layer's rewritability meant that this medium was both ephemeral and durable and lent itself to different text types, ranging from quick notes and letters to accounts and contracts (Fig. 1). For individuals, the tablets could thus be highly significant, representing a means to stay in touch with those far away, keep track of their business affairs, or prove their legal status. The tablets' reusability represented a core aspect of their versatility, and those who used this medium in Antiquity took advantage of the possibilities it offered in various ways, adapting it to their purposes.

3 Propertius is not the only one to personify his tablets. Ovid, for example, suggests that tablets should be the ones to 'test the waters' when approaching a woman, he calls them victors (*victrices tabellae*) when they help him win her over, and he berates them when they fail to do so: Ovid, *Ars amatoria* 1.437–438; *Amores* 1.11.25; 1.12. On the poets' relationship to their tablets, see e.g. Meyer 2001; on the lost tablets as a literary motive, Roman 2006.

4 For an overview of Roman tablet finds, see Hartmann 2015 with literature. Larger assemblages published since are those from London Bloomberg (Tomlin 2016) and Cologne (Tegtmeier 2016). Editions of the tablets from Troyes (France) and Tongeren (Belgium) are forthcoming.

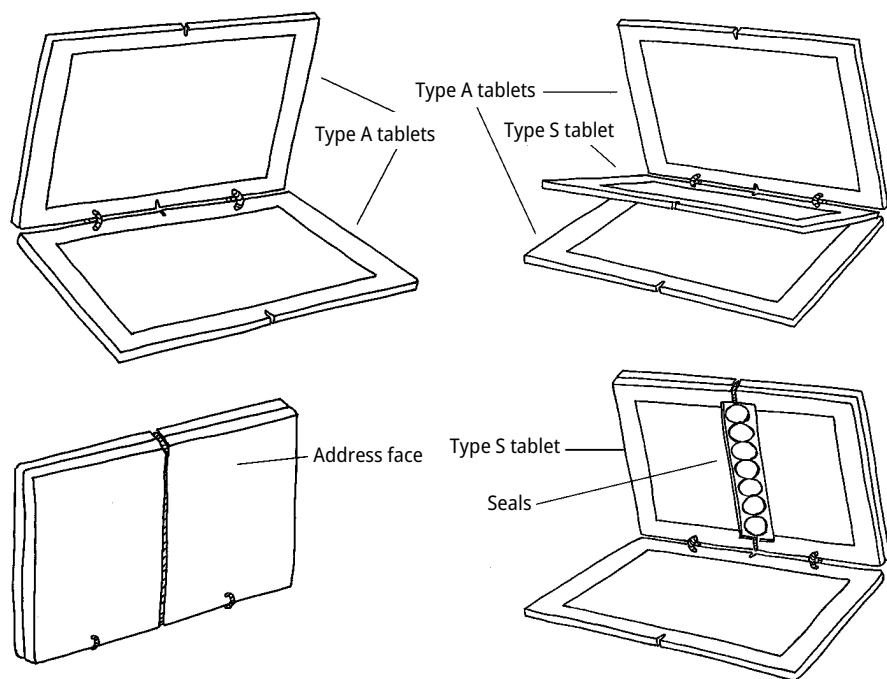


Fig. 1: Use of wax tablets for a letter (left) and in a sealed triptych (right). Drawings by Anna Willi, adapted from Speidel 1996, 19, fig. 5 and Tomlin 2016, 24, fig. 17. © Anna Willi.

Anyone familiar with Roman history will have come across stylus tablets in one way or another. Ancient authors mention them frequently,⁵ and some of us will have used replicas of such tablets in school lessons or at museums and had a go at writing into the wax. Because of how they were inscribed – repeatedly and through a layer of wax – the texts preserved on Roman stylus tablets are often faint and superimposed, making them incredibly difficult to read, but nevertheless they can give unique insights into everyday matters in the Roman Empire.⁶ Their decipherment has therefore traditionally been the focus of research, and the unpicking of multiple traces by the tablets’ editors allows us to grasp the tablets’ reuse in a very immediate way. But the tablets as objects also contribute to this story, as reuse manifests in the material evidence in a number of ways. In what follows, I explore what the tablets can tell us about reuse, about the motiva-

⁵ See e.g. Degni 1998; Willi 2021, 108–135.

⁶ On the difficulties of deciphering such texts, see e.g. Tomlin 2016, 15; for examples, also see Bowman and Tomlin 2005, esp. 9–14 on two tricky tablets from Vindolanda.

tions and habits of those who used them, about the challenges and choices they faced, and about solutions they found and decisions they made in reusing this medium.

While ancient authors such as Propertius usually reflect the situation in Rome, studying finds allows us to extend the scope to the provinces. At the basis of this chapter lies a database of finds from selected sites in the Roman north-western provinces that was compiled as part of the ‘*Tabulae Ceratae*’ (TabCer) project.⁷ Among these focus sites, the finds from Vindonissa, a first-century CE legionary fortress in Switzerland, and the Bloomberg excavation in Central London (hereafter: London Bloomberg), likewise from the first century CE, are particularly important for this chapter, since these large assemblages have been deciphered and published systematically. For the purpose of this chapter, ‘reuse’ is understood as a broad umbrella term, covering in the first instance cases in which a tablet was used more than once with its original purpose, but also including possible cases in which tablets left the context of their original function and were repurposed, or in which their materials may have been recycled into a different object.

2 Multiple texts

2.1 Refill and reinscribe

The kind of reuse mentioned by Propertius was the most obvious and common way for people to reuse a wax tablet: by erasing writing in the wax and inscrib-

7 The ‘*Tabulae Ceratae*’ (TabCer) project was funded by the Gerda Henkel Foundation and ran from 2023 to 2024. The project focused on a total of 1,651 finds from seven sites (Vindolanda, London Bloomberg, Velsen I, Vechten, Valkenburg, Vindonissa, and Tasgetium). The tablets from London Bloomberg, Vindonissa, and Tasgetium have been published with texts (Tomlin 2016; Speidel 1996; Hartmann 2011) and the tablets from Velsen I without texts (Lange 2021), while publications for the remaining sites are in progress. I would like to thank Andrew and Barbara Birley (Vindolanda Trust), Richard Hobbs (British Museum), Alex Mullen (University of Nottingham), Alex Meyer (Western University, London, Ontario), and Jasper de Bruin (Rijksmuseum van Oudheden, Leiden) for providing access to the unpublished assemblages and images thereof. I would like to thank Charles Crowther (Centre for the Study of Ancient Documents, University of Oxford), Taylor Bennett (University of Oxford), Regine Fellmann (Kantonsarchäologie Aargau), and Hansjörg Brem and Irene Ebnetter (Archäologischer Dienst Thurgau) for their support in working with the published assemblages. Finds from other sites are considered where appropriate.

ing it with a new text. In some cases, reinscribing the tablets appears to have involved removing the wax layer altogether or not filling the recess in the first place, perhaps because wax was not available; there are examples where the wax is missing and the recess was instead inscribed with ink.⁸ In such cases, the tablet could still be reused in its intended way later, by covering the ink writing with wax. Much more commonly, however, the wax layer was inscribed multiple times, resulting in palimpsests – superimposed traces of multiple texts – in the recess area (Fig. 2). Metal styluses usually had a flattened eraser end, with which individual words and whole lines could be erased and then reinscribed.⁹ This is what the ancient authors mean by ‘turning the stylus’ (*stilum vertere*).¹⁰ Another implement for working the wax layer was the wax spatula, which may have been used to erase larger surfaces or to help shape uneven wax layers and distribute wax inside the recess.¹¹ In theory, this process of erasing and reinscribing could be repeated an unlimited number of times, but the wax needed to be topped up or replaced from time to time, because it became dirty or brittle. In one of Herodas’s *Mimes*, written in the third century BCE, the mother of a reluctant pupil complains to the schoolmaster that her son neglects the tablets she painstakingly refills every month.¹²

⁸ Examples with ink writing in a recess are *RIB* 2443.13 (Chew Stoke; Turner 1956); *Tab. Tasg.* 17, 30; *Tit. Helv.* 422.1 (Vitodurum); *RIB* 2443.28 = BM reg. no. 1980,0303.91 (Vindolanda); a tablet from Hanau-Salisberg (Reuter 1999), further e.g. a fourth-century wax tablet from Egypt at the Ure Museum of Greek Archaeology, Reading (accession number 2018.6.1), which was whitened and inscribed with ink, and another example from Tunisia (Rothenhöfer and Blänsdorf 2016). In the north-west, ink-writing is otherwise more commonly found on the exterior (type A) tablets, and on outside rims for filing purposes, see Frei-Stolba and Krieger 2008, 6–11.

⁹ On Roman styluses, see the fundamental work by Schaltenbrand Obrecht 2012, and now also Colombo 2023.

¹⁰ For instance Cicero, *In Verrem* 2.2.101; Horace, *Saturae* 1.10.72.

¹¹ On Roman wax spatulas, see e.g. Feugère 1995. New wax was poured into the recess in a liquid state; see Herodotus 7.239: ἐπέτηξε τὸν κηρὸν ἐπὶ τὰ γράμματα (‘he melted the wax back again over the writing’); Ovid, *Ars amatoria* 1.437: *cera ... infusa tabellis* (‘wax ... poured into tablets’).

¹² Herodas, *Mimes* 3.14–18: ‘The wretched tablet, which I tire myself out waxing each month’ (κὴ μὲν τάλαινα δέλτος, ἦν ἐγὼ κάμνω / κηροῦς ἐκάστου μηνός).

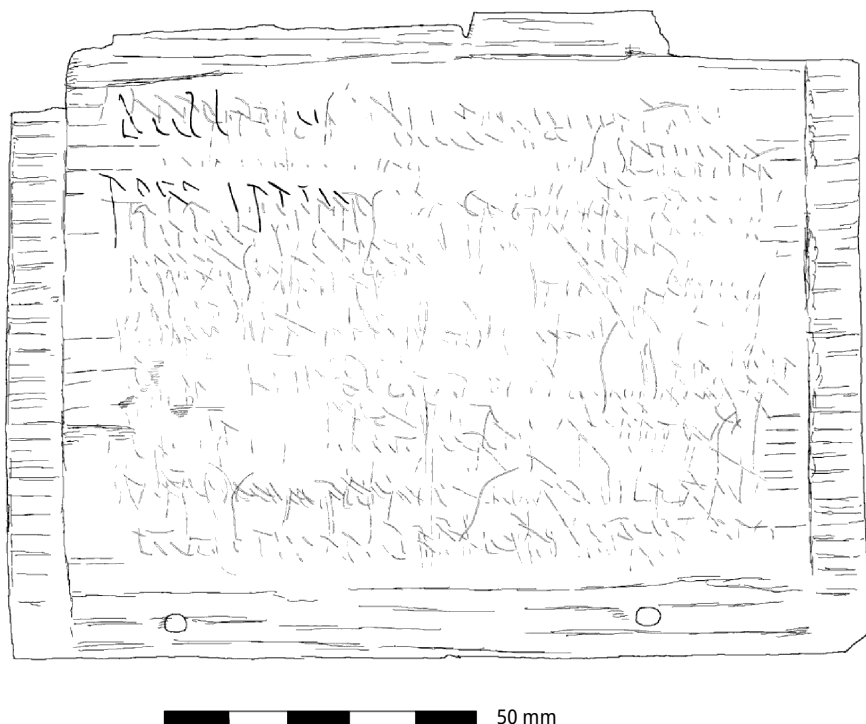


Fig. 2: Drawing of the palimpsest in the recess of tablet *Tab.Lond.Bloomberg* <WT28> from London Bloomberg (Tomlin 2016, 115, fig. 67); © Museum of London Archaeology, drawing by Roger Tomlin.

Education may seem an obvious context for the repeated use of a tablet, with the same purpose that slate tablets had in school later. The Roman rhetoric teacher Quintilian recommended his students use wax tablets for their essays, pointing out that correction is the most useful part of study.¹³ Some pupils, apparently more willing than Herodas's, left traces on wax tablets; take, for example, a writing exercise from London Bloomberg where the first few letters of the alphabet were scratched over traces of several previous texts.¹⁴ In another example, a tablet from Sulz am Neckar (Germany), part of the alphabet was inscribed twice, one on top of

¹³ Quintilian, *Institutio oratoria* 10.3.31–32, 10.4.1.

¹⁴ *Tab.Lond.Bloomberg* <WT79>. The outside of the tablet also carries the beginning of the alphabet, here scratched directly into the wooden surface. For numerals, see *Tab.Lond.Bloomberg* <WT78>. See also Tomlin 2022, 127–129 on both of these. On the Assendelft tablets containing a pupil's copies of fables by Babrius, see below n. 18.

the other, perhaps because the writer forgot the letter *O* in the first attempt.¹⁵ The number of such examples from the Roman north-western provinces is, however, small, calling into question whether this was one of the tablets' main purposes, at least in this region.¹⁶

Quintilian's testimony also points to drafting more generally. We can sometimes grasp the drafting process in tablets where individual words or short passages are overwritten. In a tablet from London Bloomberg, for example, a loan note dated to 57 CE, the writer appears to have rephrased a sentence in the passive voice that before had been in the active voice.¹⁷ Literary drafting, however, which was also done on wax tablets according to Roman authors, is not attested in tablet finds so far, and literary texts on wax tablets are uncommon in the Roman north-west.¹⁸

Instead, the three main purposes for which preserved tablets from the Roman north-west were used – two of which are mentioned by Propertius – are the following: correspondence, record-keeping, and financial and legal documents. These three purposes illustrate the bandwidth of stylus tablets, which oscillated between the ephemeral and the lasting. The recipient of a tablet containing a letter may have erased and sent it back with a reply, or only kept it for a short time until the next letter needed writing.¹⁹ A tablet used for records may have been kept for longer, for example, for keeping track of deliveries received or purchases made, with the same tablet being reused at different times within the lifespan of the same document, as is the case with a list of beer purchases from London.²⁰ Sealed documents, on the other hand, such as Caesar's will, 'on the last

¹⁵ Wiegels 1982, 347–351.

¹⁶ On wax tablets used in education, see e.g. Meyer 2004, 23–24. School tablets are better known from Egypt; see e.g. Crihiore 1996, 65–69.

¹⁷ *Tab.Lond.Bloomberg* <WT44>; also see <WT29>.

¹⁸ On literary drafting, see e.g. Horace, *Saturae* 1.10.72, challenging those who want to write something that will be read more than once to edit their texts frequently by turning around the stylus (*saepe stilum vertas, iterum quae digna legi sint scripturus*). On the materials used in the composition of literary works according to ancient authors, see Dorandi 2007, 13–28. Wax tablets with literary texts from the eastern Mediterranean are understood to be copies of published work; see e.g. five third-century CE tablets purchased in Palmyra and containing fables by the author Babrius, inscribed as an exercise in an educational setting (the so-called Assendelft tablets; see Hesseling 1892–1893), or Berlin, Staatliche Museen zu Berlin, Ägyptisches Museum und Papyrussammlung, P. 14283 from Thebes (*SH* 705), dated to the first century CE but possibly containing parts of an elegy by Poseidippos composed three centuries earlier.

¹⁹ See e.g. Augustine, *Epistulae* 15.1, asking Romanianus to return some of his tablets as he had none left (Tomlin 2016, 18).

²⁰ *Tab.Lond.Bloomberg* <WT72>.

tablet' of which he adopted Octavian according to Suetonius,²¹ or the service discharge of a soldier found in Vindonissa,²² must have been kept long term and stored unaltered, possibly stowed away on shelves or in baskets and chests, as was the case with the archives found at Pompeii and Herculaneum.²³

All of these text types can be found on tablets with evidence of reuse, but the different degrees of ephemerality must have impacted how readily a tablet with a specific text type was reused, and to a certain extent such differences can be seen in the tablet finds. In the case of legal documents, their content would have had to become invalid for the tablets to be reused, and reuse for such documents, while not uncommon,²⁴ does appear to be less common than for letters. For the London Bloomberg tablets, Roger Tomlin found that 67 per cent of the identified letters and 40 per cent of the identified legal and financial documents and accounts are on tablets with evidence of reuse.²⁵ The vast majority of the tablets from Vindonissa for which a text type can be identified are letters (80 in the TabCer database), and more than half of them are on tablets with evidence of reuse (44 in the TabCer database).²⁶ The high number of letters on reused tablets may reflect a habit of returning them with a reply, but other factors may have been at play depending on the local circumstances. In the military context of the legionary fortress at Vindonissa, Michael Speidel suggests that the frequent reuse of tablets may also be related to the fact that soldiers had to procure tablets for private correspondence themselves, while those for official use were provided.²⁷ In any

²¹ Suetonius, *Divus Iulius* 83: *in ima cera*.

²² Speidel 1996, no. 1 = KAAG inv. 7256.

²³ On shelves: the tablets from the 'casa del Salone nero' in Herculaneum (Camodeca 2017, 47), and see the relief from Buzenol (France), Binsfeld 1973, 204–205 with fig. 4. In a wicker basket: archive of the Sulpicii (Murecine near Pompeii, Camodeca 1999, 12–13); Gröschler 1997, 26 suggests that the tablets from Murecine were waiting to be reused. Wooden chests or boxes: Herculaneum tablets (*TH*², Camodeca 2017, 40–50); ink inscriptions on the tablets' outside rims probably served to label tablets in storage for easier retrieval; see e.g. Frei-Stolba and Krieger 2008, 6–11. Tablets may have been stored for a long time; some of the Campanian tablets with dates were issued decades before the eruption of Mount Vesuvius. Another indication for long-term storage may be woodworm, which is not uncommon in Roman tablets; see Tegtmeier 2016, 63.

²⁴ Among the Campanian tablets see e.g. *TPSulp* (= Camodeca 1999) 5, 10, 75, 83; *TH*² A10 = Camodeca 2017, 271–279. Further, see a legal document from Rottweil with signs of reuse: Wilmanns 1981. A receipt from Hanau-Salisberg was written in ink, which may suggest that the tablet was reused (Reuter 1999).

²⁵ Tomlin 2016, 18, with table 2. Also see Meyer 2004, 24, n. 14, implying that correspondence was not usually the initial purpose of wax tablets.

²⁶ See Meyer 2004, 177, n. 40: 'eighty-five fragments used for at least ninety-four letters'.

²⁷ Speidel 1996, 20.

case, it appears that reuse of stylus tablets often occurred in a personal context, for private letters.

Numbers such as the ones cited above are site specific and should not be generalized, including because it is difficult to know just how many finds have palimpsests and how common it was to reinscribe stylus tablets in general. Publications often focus on legible texts, and editors do not always specify when multiple texts can be seen in tablets that preserve illegible traces of writing. For London Bloomberg, Tomlin counted more than 100 tablets with palimpsests,²⁸ which amounts to approximately one quarter of the finds, but more than half of the 181 tablets that preserve traces of writing from the site. Among the more than 600 tablets from Vindonissa, Speidel counts 185 with traces of writing,²⁹ Of these, 116 receive numbers in his catalogue.³⁰ He notes multiple texts for 41 tablets, amounting to approx. 22 per cent of the tablets with traces of writing and approx. 35 per cent of the tablets he describes. This includes multiple texts on the outside of exterior tablets (type A; see Fig. 1), where writing was scratched directly into the wooden surface, and which can serve as a proxy for multiple texts on the inside. The number may be higher, however, as multiple texts may not have been noted in all cases where they can be seen. As a rough estimate, we can perhaps assume that, in total, around a third to half of the tablets that preserve writing show evidence for multiple texts.

In addition to the publication bias, the question of how many tablets were reinscribed is further complicated by the fact that the exact relationship between wax layer and writing trace is somewhat controversial and still not fully understood. It needs to be emphasized that the majority of tablet finds does not preserve any traces of writing.³¹ This fact has been explained by pointing to the poor preservation of the surfaces in question, or, more commonly, just ignored.³² But another factor is at play here, namely the way in which the tablets

²⁸ Tomlin 2016, 16.

²⁹ Speidel 1996, 16.

³⁰ Accounting for his no. 90, which lists several tablets, and not counting two that are not ancient texts (nos 88* and 89*).

³¹ The proportions vary, but tablets with traces of writing generally represent less than half of the finds from any given site. Of 612 tablets from Vindonissa, 185 preserve traces of writing (Speidel 1996, 16); of 405 tablets from London Bloomberg, 181 preserve writing (Tomlin 2016, 1); while only 91 of over 800 tablets from Cologne do (Tegtmeier 2016, 59 and table 7).

³² In *RIB* II.4, p. 11, Robin George Collingwood and Richard Pearson Wright suggest that the fact that the wax where it survives is black 'may suggest that legibility was ensured by intentionally exposing the white surface of the wood below with the point of the stilus, accounting for surviving scratches more plausibly than by mere fortuitous heavy-handedness. Admittedly many tablets

were inscribed and the habits of their users. Some scholars assume that scratching through the blackened wax to, or into, the lighter wooden surface underneath was the default way of inscribing these tablets in order to make them legible, while others assume that traces of writing were left in the wooden surface only by accident, when the writer pressed particularly hard.³³ A contrast effect between stains from the dark wax and lighter writing can indeed be seen in certain finds (Fig. 3), and it is possible that this effect was desired in some cases, but it is unlikely that it was the default.³⁴ It is surprisingly difficult to graze the wood under a layer of beeswax – even a very thin one of just 1 mm thickness – and the regularity and flow of the preserved writing in many cases makes it seem unlikely that the respective writers used a lot of force. However, there are several possible reasons why someone may have scratched through the wax into the wooden surface, including the use of a softer wax mixture,³⁵ or a habit of ‘shaving down’ the wax layer through erasing until it was very thin and needed topping up; if this refilling was left too long, then the writer may

now show no traces of writing, but this may be accounted for in large measures by poor preservation of the surface’. Also see Bohn 1925, 43 about the tablets from Vindonissa found until then: ‘Leider ist auf weitaus den meisten Tafeln durch Vermorschung der obersten Holzfaser die an sich nirgends tiefe Schrift ganz oder bis auf schwache Spuren zerstört’ (‘Unfortunately, the writing, which to begin with is not deeply incised anywhere, is entirely destroyed or only preserved as weak traces on the vast majority of tablets, through decay of the topmost wood fibre’).

³³ That scratching into the wood was purposeful is suggested by Collingwood and Wright in *RIB* II.4, p. 11, and by Speidel 2022, 107, that it was accident e.g. by Frei-Stolba and Krieger 2008, 5 and Jördens et al. 2015, 373. Both interpretations appear to be deemed possible by Lange 2021, 69. The carving of letters into wood for pupils to trace is mentioned as a teaching method by e.g. Quintilian, *Institutio oratoria* 1.1.27 and Hieronymus, *Epistulae* 107.4.3; but in both instances this is as opposed to writing into wax, which suggests that it was not the default.

³⁴ Examples where the contrast is visible in finds are BM reg. no. 1989,0602.15 (Vindolanda; see Bowman and Tomlin 2005, 10–11), BM reg. no. 2011,8028.1 (Vindolanda; see Fig. 3), Speidel 1996, no. 52 = KAAG inv. 43:190 (Vindonissa).

³⁵ The composition of the wax used for writing in Antiquity is the subject of ongoing research; see e.g. Cammarosano et al. 2019, esp. 153–158, with previous literature. Ancient literary sources mention softer and harder wax; specifically in association with writing tablets see Diogenes Laertios 7.37, who mentions tablets with hard wax that are difficult to inscribe but preserve writing well (according to Diogenes, Zenon compared his successor, Cleanthes of Assos, to them). See further Plato, *Theaitetos* 191 c–d, using a ‘block’ of wax as a simile for the mind and comparing what we learn impressing into it to different degrees to the use of a seal ring with waxes of different qualities. Cicero, *De oratore* 3.177 compares the versatility of language and speech to the malleability of *mollissima cera* (‘very soft wax’), implying the existence of harder wax. Different types of wax are also implied by Cicero, *Divinatio in Caecilium* 24, who mentions legitimate and illegitimate wax (*cera legitima, non illa infami ac nefaria*).

have scratched into the wood accidentally. This practice is also suggested by the medieval wax tablets from Wienhausen Abbey (Germany), which have differently coloured layers of wax on top of each other, presumably because a worn-down tablet was topped up with wax of a different colour.³⁶ It is not unreasonable, therefore, to assume that some (or many?) of the tablets that preserve no visible traces of writing did carry texts which did not leave any traces in the wood, and, accordingly, some of the tablets that preserve traces of only one text in the recess area may in fact have been inscribed more than once. This may explain tablets that preserve traces of only one text but whose morphology suggests that they were used more than once (see below Section 3).³⁷ At the same time, there were undoubtedly tablets that were discarded, lost, or deposited after being used only once, and some must have been intended for single use. This may have applied to finds with an official branding stamp on the outside, for example, which served as a seal of the issuing authority, suggesting that the content was meant to be fixed.³⁸ It is also difficult to establish how many times such tablets were generally reused – or, to be more precise, how many times their reuse left traces under the wax. The number we can sometimes find in research literature is two to three times,³⁹ but it can be very difficult to know how many superimposed texts there are when there are more than two; in his edition of the London Bloomberg tablets, Tomlin often simply notes ‘used many times’.⁴⁰

³⁶ On shaving down the wax layer, see Willi and Colombo 2021. On the Wienhausen tablets, see Gerlach 1965, 33, n. 76.

³⁷ Examples from the London Bloomberg site are *Tab.Lond.Bloomberg* <WT27>, <WT35>, and <WT80>; see Tomlin 2016, 18.

³⁸ Tablets with traces of only one text (financial and legal documents) and no other signs of reuse were noted by Tomlin: e.g. *Tab.Lond.Bloomberg* <WT44>, <WT45>, <WT48>, <WT54>, and <WT55>. Tablets with branding stamps: e.g. Tegtmeier 2016, plates 13,4+5, and 84,1+2, no. T 283 and 236 (Cologne), *RIB* 2443.1+2 (London), BM reg. no. 1989,0602.32 (Vindolanda), Speidel 1996, no. 65bis = KAAG inv. 14198 (Vindonissa).

³⁹ See Marichal 1973, 365, about the tablets from Vindonissa. Also see Galsterer 1986, 152, with a similar observation regarding the approx. eighty tablets from Cologne found ‘Am Domhof’ between 1978 and 1980: ‘fast alle Tafeln sind mehrfach – bis zu drei Mal – übereinander beschrieben’ (‘almost all tablets have multiple – up to three – superimposed inscriptions’).

⁴⁰ See *Tab.Lond.Bloomberg* <WT4>, <WT11>, <WT20>, <WT23>, <WT64>, <WT95>, <WT103>, <WT120>, <WT132>, <WT146>, <WT150>, <WT178>.



Fig. 3: A tablet from Vindolanda containing a letter, with black colouring from the wax contrasting with the light writing (BM reg. no. 2011,8028.1); © Trustees of the British Museum.

2.2 Reuse for correspondence

While it is difficult to put numbers on the habit of reinscribing tablets, it is interesting to take a closer look at what appears to have been a common purpose for reused tablets: private letter writing. Numerous Roman authors mention wax tablets being used for letters in various situations, from short messages to love letters.⁴¹ Correspondence can be identified in tablet finds through letter elements, such as greetings or addresses, which are very common in non-specific assemblages of tablets.⁴² In the vast majority of cases, addresses are all that remains and the only part of a letter still legible: they were usually

⁴¹ See e.g. Plautus, *Bacchides* 4.4.74–112; Ovid, *Metamorphoses* 9.522–525; more generally Degni 1998, 41–42, for the Roman Republic.

⁴² The Italian and Dacian tablets were the earliest assemblages to be discovered but are exceptions in that they consist of individual archives and therefore mainly contain legal and financial documents (Russu 1975; Camodeca 1999; Camodeca 2017). That wax tablets were also frequently used for letters was first confirmed by the finds from Vindonissa (Marichal 1973, 365).

scratched directly into the wooden outer surface of exterior tablets (type A, Fig. 1, left), usually in much larger letters than the text on the inside and often in a script closer to capital letters than the cursive script commonly used for interior texts. Not every letter had to have an address on it. Propertius's contemporary Ovid, for example, may not have needed to put an address on the tablets he sent to his love interest Corinna: her maid, Nape, was the letter carrier and would have known who to deliver the message to.⁴³ However, many senders must have used someone as a letter carrier who just happened to travel in the right direction, possibly a complete stranger, and for them addresses would have been crucial; for example, a tablet from Carlisle (England) was to be given to M. Iulius Martialis at 'either Trimontium or Luguualium', which were around fifty miles apart, as the crow flies.⁴⁴

Corinna may have erased Ovid's message and sent a reply on the same tablet, and if they used their names in the letter texts, then this back-and-forth potentially would have left traces in the wood of the tablets. In rare cases, correspondence between two people can be established from addresses on separate tablets, for example, in Vindonissa between Vindoina, possibly a local woman, and Annus Lucianus, possibly a soldier.⁴⁵ To my knowledge, though, it has not been possible to track a direct back-and-forth between senders on the same tablet. Some tablets that carry more than one address and on which the letter texts are no longer legible may, however, be the result of such a scenario, and they, in any case, illustrate that some letter tablets were kept for later reuse for the same purpose. Usually no more than two, and, rarely, three, addresses can be distinguished on the same tablet, which might confirm the general assumption that this is how many times individual tablets were reused. Yet there is no inherent reason why they could not have been reused more times than that, and more addresses may have been inscribed on missing tablet parts, or on the (usually lost) other exterior tablet of a codex.⁴⁶ We can imagine that someone who wanted to inscribe a tablet with a new address would have avoided overwriting the previous address, and several addresses on the same tablet may have caused confusion if the carrier did not know

⁴³ Ovid, *Amores* 1.11–12.

⁴⁴ *RIB* 2443.10.

⁴⁵ Speidel 1996, nos 42 and 43 (KAAG inv. 42:15 and 23:1467).

⁴⁶ Two addresses: e.g. on Speidel 1996, no. 48 = KAAG inv. 51:304; no. 6 = KAAG inv. V.03.50/0.3. Written in clearly different hands: e.g. on *Tab. Tasg.* 3; *Tab. Lond. Bloomberg* <WT3>; Speidel 1996, no. 25 = KAAG inv. 52:69a. Traces of three or more addresses: on e.g. Speidel 1996, no. 32 = KAAG inv. 23:1466; no. 14 = KAAG inv. 4766.

which of the addresses to deliver to. This is at least suggested by examples from Tasgetium (Switzerland) and London Bloomberg, where two recipients are named, in different hands, but seemingly not otherwise differentiated.⁴⁷ Senders may have found various solutions for this problem that we can no longer discern; in some cases from Vindonissa, it appears that the older address was rubbed off, and in one example the tablet was in addition turned around and the new address inscribed 'upside down', albeit with a rather confusing result, at least to our eyes (Fig. 4).⁴⁸

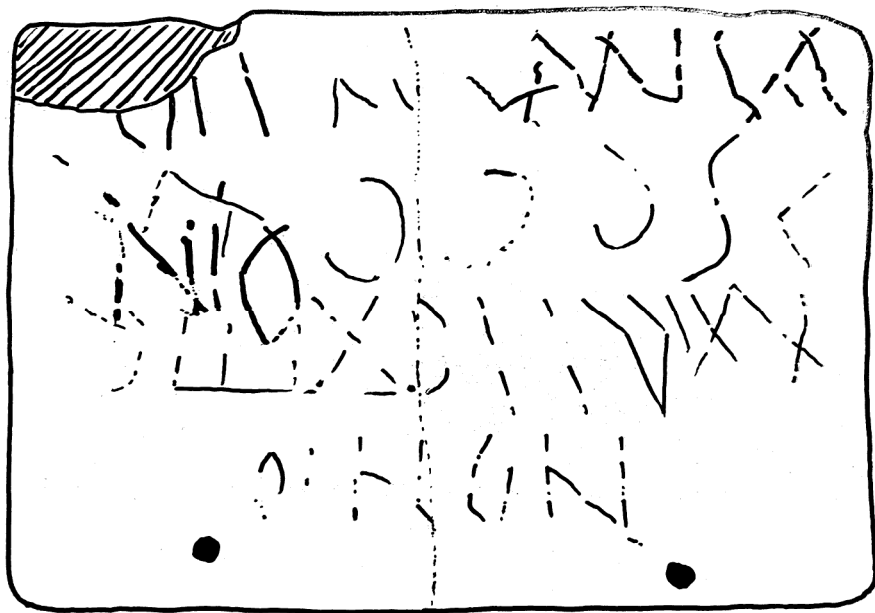


Fig. 4: A tablet from Vindonissa with an address overwritten with a later one upside down (Speidel 1996, no. 6 = KAAG inv. V.03.50/0.3): (a) *Venula/nto*, 'To Venulantus', (b) *Nonio / mil(iti) leg(ionis) XIII G(eminae) / >(centuria) Socci*, 'To Nonius, soldier of the thirteenth legion Gemina, centuria of Soccus'. Reproduced with permission of KAAG.

⁴⁷ *Tab. Tasg. 3; Tab.Lond.Bloomberg <WT3>*.

⁴⁸ 'Upside down': Speidel 1996, no. 6 = KAAG inv. V.03.50/0.3. Erased previous address: in e.g. Speidel 1996, no. 41 = KAAG inv. 11386; no. 44 = KAAG inv. 28:3133; no. 48 = KAAG inv. 51:304.

The reuse of wax tablets becomes particularly interesting when different text types are inscribed on the same tablet, as Propertius fears may be the case with his lost tablets. In his case, his dear *tabellae* went from a creative and playful but ephemeral use – an outlet for his voice as a poet and admirer – to a practical and dry but lasting use: it is as if the tablets completely changed character. A tablet from Vitudurum (Oberwinterthur, Switzerland) appears to have suffered a very similar fate: it was first inscribed with an address and later used to record a *ratio*, or account, of Vinedo.⁴⁹ However, the opposite trajectory appears to be more common in finds from the north-western provinces. A tablet from London Bloomberg, for example, first contained a dated document, perhaps a loan note, and later a letter, while a seal tablet from Vindonissa was first inscribed with a contract and a list of witnesses, then with a letter and an address.⁵⁰ In another tablet from London, the original text in the recess (a legal or financial document?) appears to have been crossed out – perhaps because it was reused as a letter: it carries an address on the outside (Fig. 5).⁵¹ From such examples it appears that those who needed to write a letter may just have reached for whatever tablet was available. In the users' eyes, there may not have been as clear a distinction between letter tablets and legal tablets as we think, but morphologically the difference can be very clear.

49 Fellmann 1991, H 16 = *Tit. Helv.* 422.2.

50 *Tab.Lond.Bloomberg* <WT28>, see Fig. 2; Speidel 1996, no. 4 = KAAG inv. 43:224. Meyer 2004 generally assumes that the purpose of tablets was a legal one first and foremost, and that correspondence was how they were reused (e.g. Meyer 2004, 24, n. 14).

51 *Tab.Lond.Bloomberg* <WT8>.

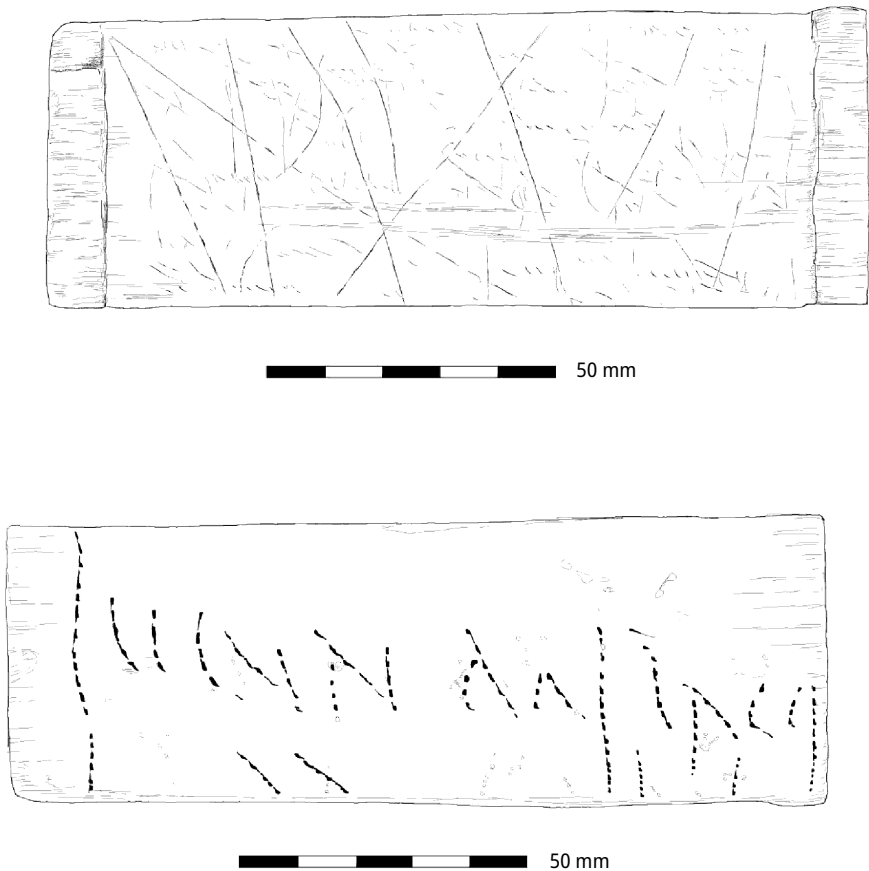


Fig. 5: Tablet <WT8> from London Bloomberg, with cancelling scores on the inside and an address on the outside: *Iucundo Flauī (filio) / [---]* ('To Iucundus, (son) of Flavius') (Tomlin 2016, 75, figs 45 and 46); © Museum of London Archaeology, drawing by Roger Tomlin.

Among the three main tablet types, the seal tablet is the most specific one.⁵² Letters were usually written onto type A or exterior tablets, which have one recessed

⁵² For the typology and the combination of tablets into triptychs, see Speidel 1996, 22–28. Unsurprisingly, exterior (type A) tablets are by far the most common finds. Out of 1,182 tablets with identifiable type from the TabCer focus sites (excluding Valkenburg and Vechten), 888 = 75.1 per cent are type A, with percentages for each site ranging from approx. 60 to 80 per cent. Seal tablets make for approx. 24 per cent of the total, ranging between approx. 20 to 40 per cent. By far the least commonly found type is type I, an interior tablet with two recessed faces but not designed to

face and one exterior face without wax and were bound together in diptychs for letters. Exterior tablets were also used for the two outer leaves of sealed triptychs (Fig. 1). The central tablet in such triptychs was a seal tablet, type S. This type has one fully recessed face, while the other face usually has two recessed panels separated by an even further recessed groove down its middle, which would have received the witnesses' seals. The panels on either side of it were inscribed with their names, and sometimes also with part of the exterior, accessible version of the document, while the sealed copy was safely hidden away on the fully recessed faces of the first type A tablet and the seal tablet.⁵³ This means that the very specific morphology of seal tablets was closely tied to their function: we can assume that the initial purpose of such finds was to be part of a sealed diptych or triptych, and that they were destined to carry a legal or financial document that needed to be sealed with witnesses. Accordingly, when other text types are found on seal tablets, it means that the tablet was most likely removed from its original context and purpose. In Carlisle, for example, someone reused a seal tablet for a list of items and what appears to be their prices,⁵⁴ and at least one seal tablet from London Bloomberg appears to have been reused for an account.⁵⁵ More commonly, we can see seal tablets that carry traces of correspondence, mostly recognisable through addresses. These are usually on the side of the tablet that would have received the seals, meaning that this side would have been on the exterior of a letter codex (Fig. 6).⁵⁶ Parts of letter texts are also sometimes preserved on seal tablets, most commonly on the fully recessed side.⁵⁷

receive a seal, which could have been used to add more leaves to a document. Judging from the scarce finds, however, this may not have been done very frequently: absolute numbers for certain I types from individual sites range between 0 to 7. Type I tablets can be difficult to distinguish from type S when only a corner is preserved, but the number of ambiguous fragments is not very big either, ranging between 3 to 10 finds per site (status July 2024).

53 Camodeca 2007 discusses the ways in which diptychs and triptychs were used and the text distributed over the different tablets based on the tablets from Pompeii and Herculaneum.

54 Tomlin 1992, 148.

55 *Tab.Lond.Bloomberg* <WT70>.

56 Vindonissa: Speidel 1996, no. 4 = KAAG inv. 43:224; no. 26 = KAAG inv. 43:235. Vindolanda: BM reg. no. 1988,1005.282 and 1989,0602.25 (see Birley, Birley and Birley 1993, plate VI); possibly 1988,1005.279 (see Birley, Birley and Birley 1993, 30).

57 *Tab.Lond.Bloomberg* <WT26>, <WT34>, <WT35>, <WT39>. On the seal side: BM reg. no. 1988,1005.288; see Bowman and Tomlin 2005, 9–10.

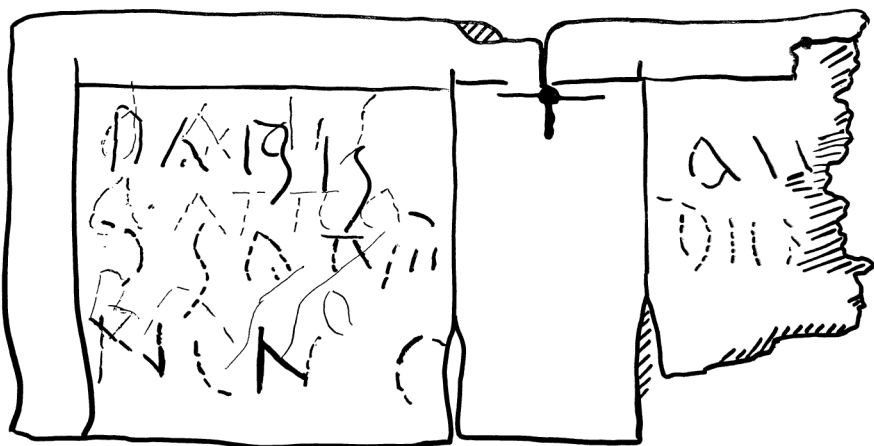


Fig. 6: A seal-tablet from Vindonissa that was inscribed with two superimposed addresses (Speidel 1996, no. 26 = KAAG inv. 43:235). Reproduced with permission of KAAG.

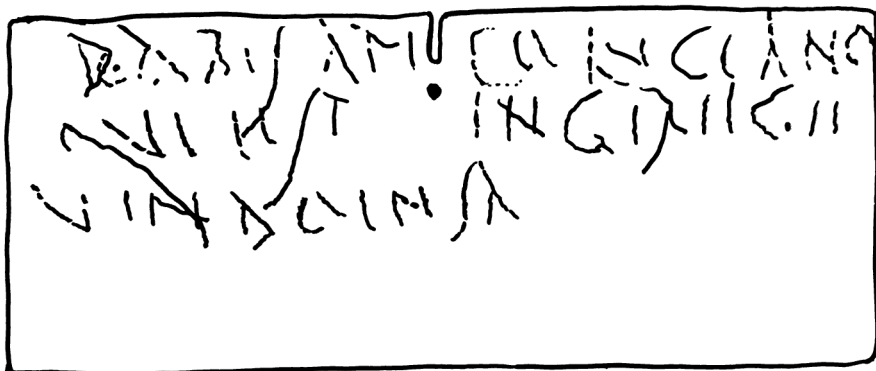


Fig. 7: Type A tablet from Vindonissa with central hole and address on the exterior (Speidel 1996, no. 43 = KAAG inv. 23:1467): *Dabis An(n)io Luciano, / qui est in gir(o) ece(stri). / Vindoinsa* ('Give this to An(n)ius Lucianus, who is at the horse track. Vindoinsa'). Reproduced with permission of KAAG.

We can take this line of thought a step further by considering the binding holes. The standard are two holes in one of the tablet's longer, horizontal rims, through which the codex could be tied together and the individual leaves then turned like the pages of a book. Some of the finds, however, have an additional, central hole near the horizontal rim. This hole is generally explained by a decree issued under Nero in order to make such documents more secure and better protected against

fraud. The decree stipulated extra holes and an extra string, without which such documents were no longer deemed valid.⁵⁸ Such central holes can be seen in seal tablets, but also in exterior tablets, which were presumably tied to a seal tablet with that hole. Accordingly, the exterior tablets with this hole may have originally carried a sealed document, and when they preserve an address on the exterior side, then correspondence may have been their secondary purpose (Fig. 7).⁵⁹ We cannot exclude that sealed triptychs could have been sent to someone, and the address therefore corresponds to the tablet's original use. A tablet from London that contained an affidavit, and thus the kind of document we might expect to have been sealed, also contains part of an address on the outside, with nothing suggesting that the two texts belonged to different phases of the tablet's use.⁶⁰ However, the presence of an address may imply that the messenger did not know the sender or the recipient, and this would appear a rather risky way of transporting important documents at the time.

The reuse of seal tablets for correspondence raises questions about the significance of this medium. The sealed codex is thought to have had a certain authority through its sheer form, closely tied to the validity of the document it carries.⁶¹ Reuse of such tablets thus implies that the person who chose them for writing a letter had a sealed document that became invalid, or that they had empty tablets that they could have used for a legal document, but did not anticipate a need for them. It has been suggested that the 'old' tablets missing the extra holes required by Nero's *senatusconsultum* in particular were often reused for correspondence because they were no longer useful for sealed documents; however, for the tablets from the north-western provinces, this observation cannot be confirmed.⁶² Tablets

58 See Suetonius, *Nero* 17; Paulus, *Sententiae* 5,25,6. For a discussion of this feature and the decree, see e.g. Camodeca 1993; Speidel 1996, 30; Meyer 2004, 163–168; Tegtmeier 2016, 22. The examples with this feature that preserve both long or horizontal rims have a central hole in each: *Tab.Lond.Bloomberg* <WT135>; BM reg. no. 1993,1103.4 (Vindolanda; see Birley, Birley and Birley 1993, plate IX); Speidel 1996, no. 90 = KAAG inv. 4780; KAAG inv. 32:1388.

59 See e.g. *RIBonline* Brit. 51.22 = BM reg. no. 1995,0701.404 (Vindolanda); Speidel 1996, no. 43 = KAAG inv. 23:1467 (Vindonissa).

60 *RIB* 2443.11 (London).

61 See Meyer 2004.

62 See Meyer 2004, 178: 'a very high percentage of those reused as letters in northern provinces are *tabulae* that are not *pertusae*, which is itself a strong indication that the requirements of the *senatusconsultum* of AD 61 were being followed. These *tabulae*, although of the wrong form, now, to be used as legal documents, were too useful to be thrown away'. I am aware of at least one tablet from the TabCer focus sites with the additional hole that was reused for correspondence: Speidel 1996, no. 26 = KAAG inv. 43:235. Another candidate is *RIBonline* Brit. 51.22 = BM reg. no. 1995,0701.404, if the text on the exterior (*Vindolande*) is indeed part of an address.

with central holes are not very common in this area, and adding extra holes to update a tablet does not seem to be a very difficult alteration if it was needed. It is perhaps unlikely that many people had empty seal tablets lying around, as using them may have involved professionals, and so the reuse of invalid documents, from one's own archive or possibly even obtained second hand, is more likely. Senders may not have had a choice of materials to write their letter on, and if they wanted to use a tablet, they may have just used an old one, not minding much that it was originally meant to be a seal tablet: from the users' point of view, there was clearly a certain flexibility when it came to tablets' shape and use.

The reuse of seal tablets also raises the question of the availability of wax tablets. In general, standard stylus tablets were mass-produced and probably not very expensive, but, as is the case with everything, the price would have depended on how easy it was to purchase tablets in any given place, whether they were made locally or imported, and whether or not the timber was easy to come by.⁶³ Certain documents or letters without doubt would have made tablets very valuable for those involved in their use, but the fact that many tablets are found where they were presumably discarded – for example, in Vindonissa's rubbish dump – might confirm the impression that they were not very valuable in material terms. Even so, we can grasp cases in which tablets or polyptychs may have been damaged and people found ways to keep using them.

3 Make do – and mend?

When writers used a seal tablet as an exterior tablet for correspondence, this implies that the triptychs were taken apart and perhaps put together in a new combination, or that they reused only two of the three original tablets. They may

⁶³ See Speidel 1996, 20–21, on the low cost of tablets. Conversely, see Criboire 1996, 65–69, on higher costs for them in Egypt, which did not produce much wood itself. One manufacturer of wax tablets is known through his tombstone: the *pugillariarius* M. Caecilius Hilarus (*CIL* VI 9841); but Rome must have been a larger and thus more specialized market than the average provincial town. For the British tablets, most of which were made of non-native timber, it has been suggested that they were imported as tablets or made from the staves of imported barrels (Goodburn 2016; see for a discussion of such scenarios Marlière and Sands 2020, 371–372, and below n. 89). Saedlou and Dupéron 2007, 85 also suggest that the tablets from Saintes were imported. However, there is evidence for local production in Cologne, but from imported timber (fir) (see Tegtmeier 2016, 77), and certain differences in the tablets' morphology and features support the hypothesis of local production, at least on a regional level (see Willi forthcoming).

have chosen to do this because they did not need a triptych and did not have two exterior tablets available, and they may also have taken apart polyptychs because one or several of the tablets or the binding cord were damaged. That polyptychs were sometimes taken apart is suggested by the collational marks known from wooden tablets from Egypt: they formed oblique scores across the back of a codex, allowing anyone to establish their original order if necessary. Such marks have not been identified on tablets from the Roman north-western provinces so far.⁶⁴ Apart from the cases with seal tablets, it is thus difficult to trace the deconstruction or recombination of polyptychs in the finds under consideration here, but a possible example are two tablets from London Bloomberg: *Tab.Lond.Bloomberg* <WT77> and <WT78> (Figs 8a–b).⁶⁵ These two exterior tablets were found in close proximity and have a very similar and unusual grid pattern carved into their exterior faces. Both were also inscribed with numerals in their recesses, possibly for writing practice in a bookkeeping environment. If they were indeed part of the same codex, as Tomlin suggests, then the fact that they were made from different wood species – larch and silver fir, respectively – may suggest that they were taken from two originally different codices and combined anew. Perhaps they were even decorated in this unusual way to make it clear they now belonged together?

⁶⁴ See Crihiore 1996, 66, and further Sharpe 1992, e.g. 138–139, figs 4–6, for an image of collational marks on the Dakhleh tablets (which, however, are wooden boards, not wax tablets). Could the shallow extra notches on some of the Cologne tablets have served a similar purpose? See Tegtmeier 2016, 56, who suggests that they could be failed holes.

⁶⁵ Tomlin 2016, 56, 234–239.



a



b

Figs 8a–b: Tablets <WT77> (a) and <WT78> (b) from London Bloomberg with similar decoration on the exterior but made of different wood species (Tomlin 2016, 235, fig. 126 and 237, fig. 128); © Museum of London Archaeology, drawings by Roger Tomlin.

Another indication that codices were sometimes taken apart may be tablets that appear to be inscribed upside down. Roman wax tablets were most commonly inscribed in landscape mode, and the first tablet of a codex was opened much like a laptop today.⁶⁶ Accordingly, the binding holes are usually at the bottom of the tablet that contains the beginning of a document, and at the top of the tablet that contains its ending. It appears that this layout was usually maintained in reuse; I am not aware of any cases where one text inside a recess is clearly written over

⁶⁶ Tablets inscribed in portrait mode, which would have been read like a modern book, are less common but exist, including in a number of depictions; see e.g. Szabó et al. 2022, 525. Portrait mode is common in the Phrygian door reliefs; see Grüll 2023, 98.

an earlier one upside down, or one in landscape mode and one in portrait mode. However, some tablets appear to have the holes in the wrong spot, at the top of a tablet with the start of a text or at the bottom of its ending.⁶⁷ Whether this was a mistake, a draft, or caused by an unusual number and combination of leaves in the codex is unclear, but one possibility is that the tablets were inscribed before they were joined in a bundle, and written upside down by accident.⁶⁸

If codices were taken apart to replace a broken tablet, for example, or to make a new codex out of the remaining tablets from two other codices, then we could address this as a case of repair.⁶⁹ Repairs of individual tablets, on the other hand, are not attested to in my knowledge, and it is not easy to think of a way how this could have been done routinely while also maintaining a tablet's functionality.⁷⁰ Sometimes, however, writers appear to have taken more extreme measures: they reused tablet halves by cutting a new notch into the broken edge. This would have allowed users to join the fragment to another one, for example the other half, and thus use the halves in a similar way to a diptych. A rare example from

67 For instance *Tab.Lond.Bloomberg* <WT44>, <WT45>, <WT48>, <WT51>, <WT52>, and <WT53>, all legal or financial documents, with <WT44>, <WT45>, and <WT48> showing no signs of reuse. Speidel 1996, no. 40 = KAAG inv. 43:194 is a letter where the ending is on a tablet with holes at the bottom, but the top half of the tablet is missing, so it is possible that it contained the whole message and the second tablet was left blank.

68 Meyer, Mullen and Tomlin 2025, 242.

69 It is possible that *RIBonline* Brit. 42.9 (London) is such a case. Only one-half of the exterior (type A) tablet is preserved, with binding holes and notch. The recess preserves six lines of scratched writing, but very little of it has been deciphered. On the outside, however, there are the six last lines of a loan note, unusually written on the outside, and even more unusually, in ink. An accessible copy of the sealed document was commonly made, but usually on wax, inscribed on the third tablet of a triptych, which could be accessed without breaking the seal. It has therefore been suggested that the tablet from London was inscribed with this exterior version in ink after the middle tablet of a triptych broke, so that it could still be used (*RIBonline* Brit. 42.9). However, if the middle tablet broke, then the witnesses' seals would have been lost, rendering the document unusable. It is perhaps more likely that the exterior version was in this case inscribed in ink from the start, as is known from Italian diptychs, in which case it could have started on the seal face of the seal tablet and continued onto the exterior face of the type A tablet. This is relatively common for Campanian diptychs, and less so but also known for triptychs; see e.g. Camodeca 2007, 85–86.

70 In a number of tablets from Vindonissa, fragments were sewn together with string – a method that, if used to repair the tablets, would have compromised their stability as well as the wax layer. An autopsy of some of these cases by the author, at the Kantonsarchäologie Aargau in June 2024, confirmed that the string is modern and likely to be a testimony to the early excavators' efforts to keep fragments together at a time when adhesives were much less commonly available; excavations of Vindonissa's rubbish dump started in 1903.

Carlisle preserves both halves of such a reused tablet and illustrates the method nicely (Fig. 9). It appears that holes were not usually added in such cases and notches were deemed enough to hold the halves together.⁷¹ This type of reuse is not very common: there are, to date, only 18 certain cases in the TabCer database of 1,781 tablets; yet it must have been an obvious solution, as it can be found across many different sites.⁷² All that a person wishing to make a new notch would have needed was a small knife, which may have been a common part of writing sets anyway, as they were used to sharpen reed pens.⁷³

All 18 certain cases with a reuse notch in my database (14 from focus sites) are exterior (type A) tablets. Not all of these reused tablets preserve multiple texts in the recess area, which confirms the suspicion that not all writing left traces.⁷⁴ Where we can identify the text type for which such tablets were used (in 8 of 18 tablets from the entire TabCer database, of which 6 out of 14 are from focus sites), they are virtually exclusively for correspondence – again confirming that reuse of stylus tablets often occurred in a personal context.⁷⁵ Whether the halved tablets were used for correspondence before or after breaking, or both, cannot always be determined. The example from Carlisle (Fig. 9) was clearly already used for a

71 *RIB* 2443.10 (Carlisle). Two notches may not have been seen as a requirement for binding tablets together either; see e.g. *RIBonline* Brit. 35.27 (Trawsfynydd) and Speidel 1996, no. 90 = KAAG inv. 4780 (Vindonissa), both of which have holes but no notch. This means that not all tablets that were reused after breaking or being broken necessarily had this reuse notch, and other halves may have to be considered for this type of reuse.

72 There are examples from at least seven different settlements in my database (Carlisle, Cologne, London, Saintes, Velsen I, Vindolanda, and Vindonissa), with uncertain occurrences increasing this number to nine (by adding Alphen and Valkenburg). Examples of tablets with such reuse notches are the following: *Tab.Lond.Bloomberg* <WT12>, <WT27>, <WT43>, <WT80>; KAAG inv. 4764 and Speidel 1996, no. 45 = KAAG inv. V.03.50/0.10 (both Vindonissa); BM reg. no. 1989,0602.18(?), 1989,0602.58, 1995,0701.389; *RIBonline* Brit. 51.23 = BM reg. no. 1995,0701.440 (all Vindolanda); *RIB* 2443.10 (Carlisle); Tegtmeier 2016, plate 10,2, no. T 276 (Cologne); Lange 2021, find no. 1519.1 and possibly find no. 3370 (Velsen I); possibly a tablet from Alphen an den Rijn (Van Rijn 2004, 230, fig. 101 = WOODAN 16202000); tablet no. 16 in Vienne 1992, 212 and 217, fig. 3 (Saintes).

73 On penknives, see briefly Willi 2021, 72–74. On writing sets more generally, see e.g. Eckardt 2018, 38–39.

74 For instance *Tab.Lond.Bloomberg* <WT27>, which appears to preserve traces of only one text, and see <WT80>, with virtually no traces of a text in the recess at all.

75 *Tab.Lond.Bloomberg* <WT4>, <WT12>, <WT27>, <WT43>; *RIB* 2443.10 and 2443.4 (Carlisle); Speidel 1996, no. 9 = KAAG inv. 42:39; Speidel 1996, no. 45 = KAAG inv. V.03.50/0.10. An exception is *RIBonline* Brit. 51.23 = BM reg. no. 1995,0701.440 (Vindolanda), which may have been reused as a purse and carries a label on its outside specifying the amount of money it may have contained (see below Section 4).

letter before it was broken, as the address on its exterior, to M. Iulius Martialis at Trimontium or Luguualium, is split by the break. One tablet half with a reuse notch from Vindonissa appears to preserve a complete invitation to a dinner party, suggesting that it belongs to the reuse phase, and in one case from the London Bloomberg site the first line of a letter to the freedman Vialicus starts right below the reuse notch, proving that the tablet was broken before the letter was inscribed.⁷⁶

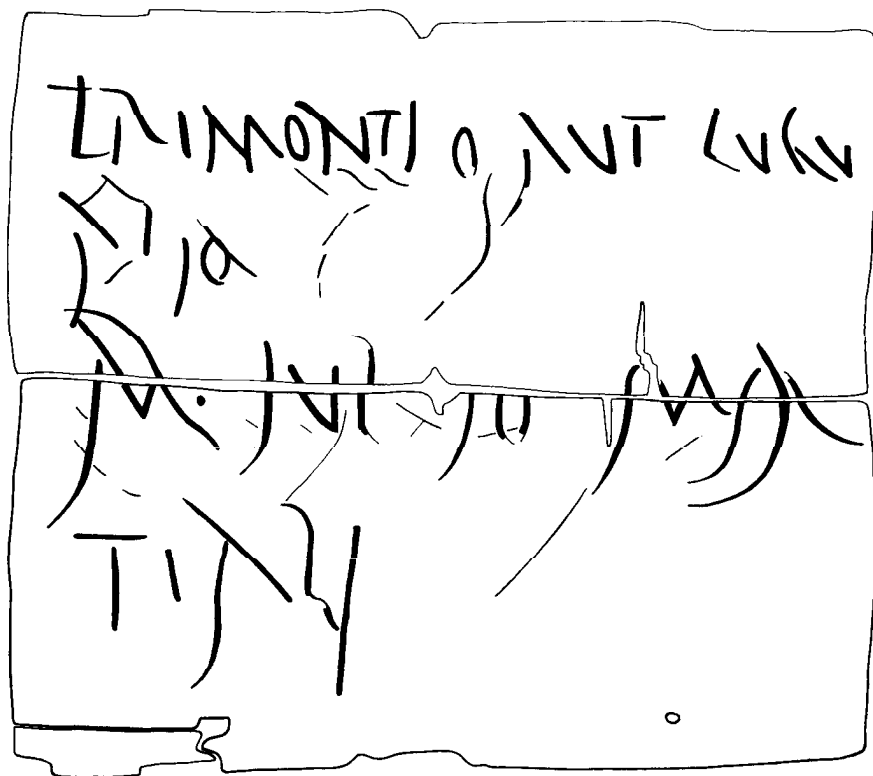


Fig. 9: Tablet from Carlisle that was reused after breaking in half (*RIB* 2443.10); © Centre for the Study of Ancient Documents, drawing by Roger Tomlin.

⁷⁶ Speidel 1996, no. 45 = KAAG inv. V.03.50/0.10 (Vindonissa); *Tab.Lond.Bloomberg* <WT27>. The reuse phase may also be evidenced where an address is preserved in full; e.g. in *Tab.Lond.Bloomberg* <WT4>, <WT12>, and possibly *RIB* 2443.6 (Carlisle).

One of the tablets with a reuse notch from the Bloomberg site in London may allow us a glimpse of its last user. The tablet, <WT4>, dates to the second half of the first century CE and measures approx. 14 × (6) cm (Fig. 10). The exterior (type A) tablet preserves the rim around the recess on three sides and is broken on the fourth. In the preserved long rim, it has a rounded cut-out notch,⁷⁷ and a V-shaped reuse notch has been cut into the broken edge. No binding holes are preserved, but they may have been in the lost horizontal rim.

The unrecessed outside surface of the tablet carries an address that was scratched directly into the wood: *Luguseluo Iunii filio dabis* ('you will give this to Luguseluus, son of Iunius'). Luguseluus is a Celtic name that was not attested before this find, but Tomlin found the female version Lucuselua in a funerary inscription from Périgueux in France (*CIL* XIII 996).⁷⁸ It is imaginable that Luguseluus was originally from Gaul, but we encounter him in London not long after Boudica's revolt, as the son of a father with an apparently Latin name.⁷⁹

This address is the only text on the tablet's outside, but Tomlin remarks that 'the inner [...] face has been used many times, and the traces are illegible'.⁸⁰ Luguseluus thus may not have been the first or only person to use this tablet, but he may have been the last one: the address is preserved in its entirety, and we find no trace of an address related to an earlier use of the tablet for correspondence – there may have been one on the missing half of the tablet or on the other tablet if this was originally part of a diptych. But something else was scratched into this tablet that may have been part of its reuse phase: a drawing was scratched onto one of the shorter, vertical rims, of two leaves that touch. To my knowledge, this is the only case of decorative drawing on an inside rim on any tablet, and the only case of any kind of figurative decoration on any of these tablets.⁸¹ Being on the inside of the rim, and thus invisible when the tablet was tied together with another

⁷⁷ On this feature, see Willi forthcoming.

⁷⁸ Tomlin 2016, 66.

⁷⁹ Indigenous names were sometimes given to the children of provincials that had Latin, or Latinized, names, but it is unclear to what extent this tells us anything about the legal status of those involved, about their attitudes towards the Romans, or even about the language(s) they spoke. On the onomastics of provincials, see e.g. the many publications by Marie-Thérèse Raepsaet-Charlier, most recently Raepsaet-Charlier 2024.

⁸⁰ Tomlin 2016, 66.

⁸¹ In addition to *Tab.Lond.Bloomberg* <WT77> and <WT78> (above, Figs 8a–b), there are a few other type A tablets with marks on them that are not writing and that may have been decorative or functional, such as grids or a kind of diamond pattern – *Tab.Lond.Bloomberg* <WT83>; BM reg. no. 1995,0701.28 and 1995,0701.29 (Vindolanda); Tegtmeier 2016, plate 85,7, no. 78,1312.4 (Cologne); KAAG inv. V.03.50/0.82 (Vindonissa) – but nothing on the interior rims, and nothing comparable to the two leaves on the Luguseluus tablet.

er, the drawing is more likely to have been decorative than to have had a purpose related to filing or similar, as may have been the case with the grids scratched into the outside surface in other finds, such as the two tablets from London Bloomberg mentioned earlier in this section (Figs 8a–b). The drawing of the two leaves fits the broken length of the rim and does not seem to be disturbed by the break, so it is likely that it was made during the reuse phase of this tablet. We can only speculate as to when exactly and why this was done. The drawing may have been made by the sender for Luguseluus, or even by him, after receiving the letter. It may have been a doodle, or it may have had a deeper meaning for those involved in this correspondence. In any case, it underlines the personal and interpersonal nature of the text, which was probably a private letter: it is probably no coincidence that we find the only clearly decorative drawing on a stylus tablet on one reused for correspondence. In all its singularity, it perhaps crystallizes this personal nature of the most common purpose for reusing such tablets: for private letters.

Reusing tablet halves has some practical implications. Apart from the missing holes and the apparent need to add a new notch, a recess that was missing a rim on one side would have been difficult to (re)fill with liquid wax. In the case of a half tablet, this may not have been a problem if it was broken with a usable wax layer in place, but it may have been a reason to throw away tablets with a reuse notch rather than reuse them again and again.⁸²

The reuse of tablet halves, apart from again raising the question of availability, also highlights the interesting relationship between reuse, cancellation, and disposal. When, and how, does the reuse of stylus tablets end?

⁸² We can also imagine ways to (re)fill an incomplete recess regardless. That this was possible is implied by those seal tablets that have segments on the seal face that are separated not by a raised rim but only by different degrees of recessing, and where not all the segments were meant to receive wax, namely Speidel types S1 and S6 (Speidel 1996, 25, 27). Melted beeswax becomes viscous relatively quickly, so it may have been enough to hold a flat object to the edge briefly until it stopped flowing, such as another tablet or perhaps something similar to the bone spatulate strips often associated with stylus tablets and whose purpose is still unclear (see Davis 2016; Johnson 2023a; Johnson 2023b; Willi 2023).

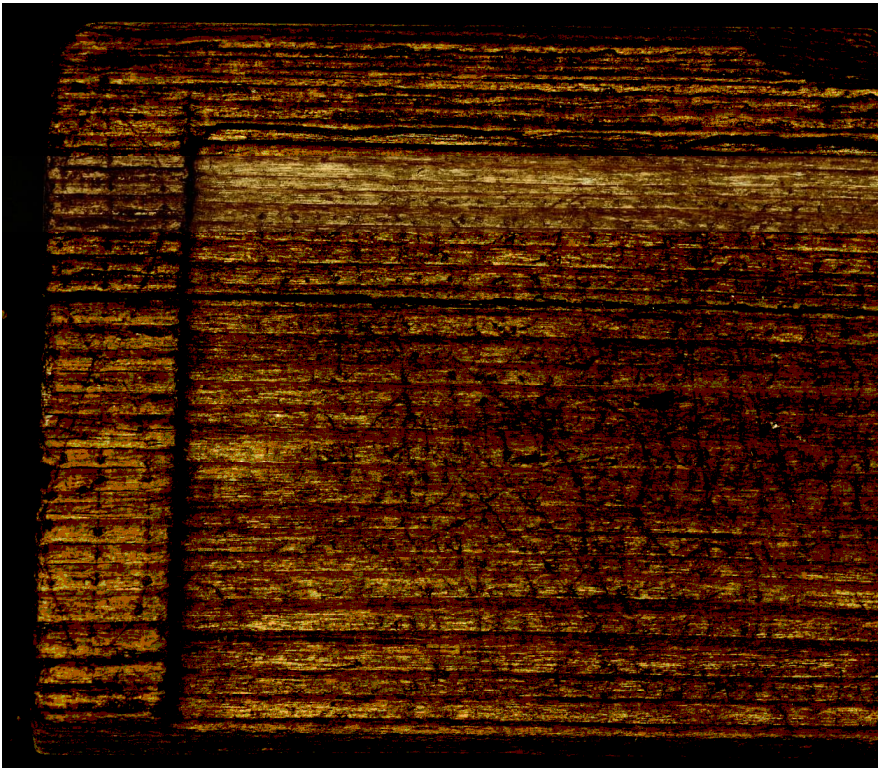
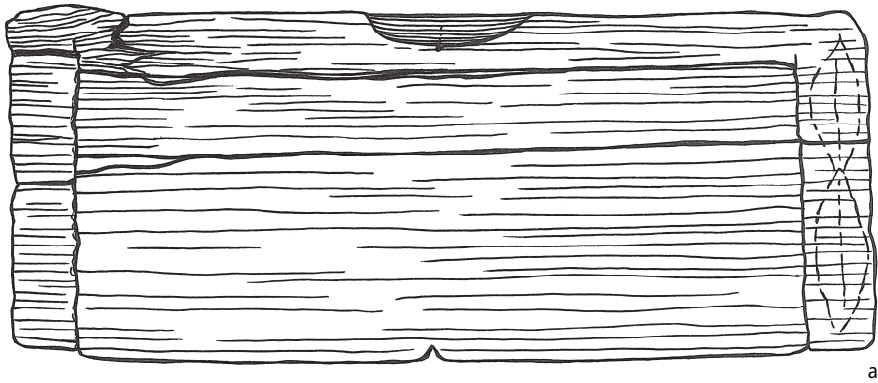


Fig. 10: (a) 'Luguseluus tablet', <WT4> from London Bloomberg. (b) Detail of RTI image with applied diffuse gain filter, © Centre for the Study of Ancient Documents and Museum of London Archaeology, imaging by Taylor Bennet. Drawing by the author, © Anna Willi.

It is unclear whether the writers broke tablets in half on purpose or whether they broke accidentally.⁸³ Someone who wanted to send a letter but only had one tablet may have halved it on purpose: reused tablet halves usually have a remaining height of around 5–6 cm, which corresponds to roughly half the average tablet height. Breaks along the grain are by far the most common kind of damage seen in tablet finds from the north-western provinces, and it has been suggested that most of them were broken intentionally before being discarded, as some of them appear to be rather sturdy.⁸⁴ Most of the broken finds show no evidence of being reused in their fragmentary state, so if they were broken intentionally, then this may have been done to cancel the document they carried, just like documents today might be shredded. It is possible that less important tablet archives were regularly thrown out in certain situations, for example, before a military unit moved on, as may be suggested by the tablet found in a pit near the milecastle at High House on Hadrian's Wall in Cumbria.⁸⁵ This would also then support the impression that stylus tablets were easy to come by and materially not very valuable in certain contexts, such as the military. Breaking a tablet does, however, seem like a rather drastic way of cancelling a document, when presumably it would have been enough to erase the writing or remove the wax. What is more, documents were also cancelled by striking through writing or scratching large crosses into the recess or onto the outside of a tablet.⁸⁶ This implies that in such cases the cancellation was meant to be on record, at least for a certain amount of time; some tablets with cancellation marks appear to have been used several times.⁸⁷ Might such visible cancellation on a reusable document even suggest an awareness of the fact that writing was sometimes preserved in the wood underneath the wax layer, and thus an effort to prevent such an accidental record of the

⁸³ Tomlin 2016, 27 thinks of intentional breaking, as does Vienne 1992, 212 regarding approx. twenty half tablets from Saintes that all have the same dimensions. One has a reuse notch: tablet no. 16 in Vienne 1992, 212 and 217, fig. 3.

⁸⁴ See e.g. Hedinger and Leuzinger 2002, 98.

⁸⁵ Simpson and Richmond 1935, 227–228.

⁸⁶ On the outside of type A tablets, e.g. large crosses: Fellmann 1991, H 16 (Vitodurum); *Tab.Lond.Bloomberg* <WT52>; BM reg. no. 1988,1005.290 (Vindolanda; see Birley, Birley and Birley 1993, 26, fig. 6.5). On the inside of type A tablets, large crosses or long diagonal strokes: *Tab.Lond.Bloomberg* <WT55>, probably <WT8>, <WT134>, possibly <WT20>; *RIBonline* Brit. 40.35 (London). On type S tablets, e.g. vertical lines down each of the two panels on the sealing side: *Tab.Lond.Bloomberg* <WT58>; BM reg. no. 2019,8012.36; Speidel 1996, no. 3 = KAAG inv. V.03.50/0.2. On the fully recessed face: *Tab.Lond.Bloomberg* <WT61>; *Tab.Lond.Bloomberg* <WT68>; BM reg. no. 1989,0602.26 (see Birley, Birley and Birley 1993, 24). Cancelling of individual words or lines: e.g. BM reg. no. 2004,0501.61 (Vindolanda; Birley 2003, 106).

⁸⁷ For instance *Tab.Lond.Bloomberg* <WT8>, <WT58>, <WT64>, <WT134>.

document being abused? As for the many tablet fragments broken along the grain, it is also possible that many of them broke by accident and were simply thrown away. Considering that tablets were usually inscribed not on a desk but while held in one's hand or on one's knees, it is conceivable that the combination of pressure on the rims, from the hand holding the tablet or from an uneven surface, and on the recess area, from the stylus or hand inscribing it, caused breaks of this kind, especially in thinner tablets.⁸⁸ This may then also be the case for some of our reused tablet halves: a tablet that broke roughly in half would have been easy to reuse as an improvised diptych.

In any case it appears that tablets' versatility was not limited to their use and reuse but also extended to the ending of this (re)use. Once the tablet was removed from its original purpose, however, the paths these objects could take do not seem to be very many, at least as far as we can identify them.

4 Repurpose and recycle?

The recycling of wood is not as frequently discussed as that of other materials used in Antiquity, such as metal or glass, which could be melted down and given an entirely new shape.⁸⁹ With wooden objects, many factors, such as their condition, dimensions, and shape, dictated what they could be made into or repurposed for to a greater extent than for metal or glass objects. Stylus tablets are small and thin and may not have lent themselves to a wide variety of recycling and repurposing. The most obvious case of repurposing is, accordingly, very close to the tablets' original function and shape, namely tablets that were made into tags. Again, we do not know whether the tablets were no longer needed and broken into smaller pieces in order to create tags, or whether this was one way of reusing

⁸⁸ It is very difficult to establish average measurements for the tablets' thickness, as many of the finds must have experienced shrinkage (or pressure, or both) in the ground, and after excavation. See Ursula Tegtmeier's thoughts on the thickness and recess depth of the Cologne tablets: Tegtmeier 2016, 48–49, 57–59.

⁸⁹ For general thoughts about repair, reuse, and recycling of wooden objects, see Sands 2022. For a case study of barrels, see Marlière and Sands 2020. It is possible that some stylus tablets started out as barrel staves, as was suggested for the London Bloomberg tablets by Goodburn 2016 because of cutoffs from staves and woodchips that may be explained by this procedure, and the fact that the tablets were usually made from non-native wood, often silver fir, which was also used for barrels. However, this theory has not, to my knowledge, been confirmed by any features of the tablets themselves, or residue of any sort, and should not be applied to other sites with even less concrete evidence. For another sceptical voice on this, see Marlière and Sands 2020, 372–373.

fragments of damaged tablets that would have been too narrow to reuse as diptychs. We also know of what appear to be purpose-made tags with a recess for wax; these are known from a number of sites across the north-western provinces and are rectangular with usually one triangular, perforated end.⁹⁰ We cannot rule out that such tags were fashioned from broken standard wax tablets, but, in some cases, the preserved rims prove that they were made *ad hoc*. An example from Tasgetium (*Tab. Tasg.* 18; Fig. 11) has no scratched traces of writing, but an illegible ink inscription is visible inside the recess, which was affected by the break, and so it must have been written before the tablet broke but after the wax was gone – or before it was even added. The tablet then broke, or was broken, but was too narrow to reuse as part of a diptych. Instead, the tablet was given two holes on one end to attach it to something, and another illegible ink inscription on the outside corresponds to this phase.⁹¹



Fig. 11: *Tab. Tasg.* 18 = AATG inv. 2002.051.722.1 from Tasgetium, repurposed as a tag; © AATG.

Other cases of repurposing are difficult to grasp, but certain unusual features may be a result of it, for example, tablets with unexpected or unusual holes. A particularly large exterior tablet from the London Bloomberg site (<WT89>, 18 cm wide; Fig. 12) features fifteen holes in addition to the two expected ones, which run along not just the long edge of the recess but also the preserved bits of the short rims. If the holes were meant for string, then we can imagine that this ‘stitching’ would have kept the codex shut, perhaps as an extra security measure during transport. However, since this tablet also has the expected two binding holes, and

⁹⁰ London: *Tab.Lond.Bloomberg* <WT183>; BM reg. no. 1934,1210.98. Cologne: Tegtmeier 2016, plate 57,5, no. H 607. Possibly Saintes: Saedlou and Dupéron 2007, 81, fig. 2.7. Possibly Vindolanda: BM reg. no. 1993,1103.58.

⁹¹ Hartmann 2011, 145. Another fragment repurposed as a tag is BM reg. no. 1988,1005.110 (Vindolanda; see Birley, Birley and Birley 1993, fig. 6.1).

‘stitching’ around the whole recess would have made the codex rather inconvenient to use, the holes may belong to a secondary use of the tablet.⁹²



Fig. 12: Unexpected holes: <WT89> (London Bloomberg); © Museum of London Archaeology.

In another, so far unique, case, it has been suggested that a tablet from Vindolanda was made into a purse.⁹³ It has a reuse notch, but the text on the outside is not an address but rather an amount of money (24 denarii) and an instruction for its use: *in me[r]cim/onium* (‘for merchandise’). In this case, someone appears to have taken advantage of the container-like properties of wax tablets when repurposing tablet halves.

Further clues for potential reuse of the tablets as something else comes from unusual cuts or breaks, where tablets appear to have been recut. What they were meant to be is unclear, but one can imagine situations where a piece of thin wooden board could come in handy, for example to make a cover for something, to fix a hole of irregular shape, or as part of another, perhaps composite wooden object, such as a box lid. Some tablets appear to have been given a rounded shape, and others cut on the diagonal (Fig. 13a).⁹⁴ We could perhaps also imagine that smaller pieces of tablets were used as fire starters, especially if they still had a bit of wax on them; some tablets have vertical, against-the-grain cuts or breaks that are difficult to explain as natural and appear as if someone tried to break them

⁹² Other examples of tablets with unexpected holes that *might* be connected to reuse are from Cologne (Tegtmeier 2016, plate 85,6, no. 66,256.9), Vindolanda (BM reg. no. 2019,8012.76), Vitudurum (Fellmann 1991, H 16), and Vindonissa (KAAG inv. V.03.50/0.137). In the case of Vindonissa, the holes could be related to modern repair; see above n. 70.

⁹³ *RIBonline* Brit. 51.23 = BM reg. no. 1995,0701.440.

⁹⁴ Rounded: KAAG inv. 23:1625 (Vindonissa); BM reg. no. 1988,1005.37 (Vindolanda); Tegtmeier 2016, 42 and plate 23,2, no. H 545 (Cologne). Diagonal: KAAG inv. 23:1610 and 42:73 (Vindonissa); Tegtmeier 2016, 42 and plate. 23,1+3, no. T297 and T 322 (Cologne); perhaps also BM reg. no. 1993,1103.192; 1993,1103.133; 1989,0602.57.

into smaller pieces (Fig. 13b).⁹⁵ On the whole, however, wax tablets as objects appear to have been, and remained, closely related to their function as a support for writing. If they were recycled or repurposed in just as many ways as those in which they were reinscribed and reused, then we can no longer see this variety. Further research may be able to tell us more about why so many tablets were discarded and the many reasons why their reuse eventually ended.



Figs 13a–b: Interesting cuts or breaks: (a) BM reg. no. 1988,1005.37 (Vindolanda © Trustees of the British Museum) and (b) *Tab. Tasg.* 12 = AATG inv. 2007.003.1281.1 (Tasgetium © AATG).

⁹⁵ KAAG inv. V.03.50/0.142 and 9614 (Vindonissa). See, however, *Tab. Tasg.* 12, where the vertical break starts from the notch, which makes me wonder if it was accidental. Also see suspicious vertical cuts or breaks in *Tab. Lond. Bloomberg* <WT136> and possibly <WT151>. These are all type A tablets. In type S tablets, vertical breaks are common along the seal-strip edges; see e.g. BM reg. no. 1993,1103.38 (Vindolanda).

5 Conclusions

Reusability was a core aspect of the *tabula cerata* or wax tablet, and it contributed to the tablet's versatility as a medium. When we look beyond the texts and include the tablet's morphology, it becomes clear that the ways in which it could have been reused, and the types of evidence showing reuse in them are also numerous. Because of publication bias, uncertainties as to how exactly palimpsests came about, and the many different factors shaping the character of the assemblages that were preserved, it is very difficult to put numbers to the frequency of reuse. The practice of reuse most likely did not always leave traces and thus may have occurred much more frequently than the rough estimate of up to half of the tablets that our evidence currently allows for.

What we *can* see in the material evidence is that people across the Roman north-west adapted this medium to their needs and purposes and made it their own, sometimes in creative ways. They were rather free in it, it seems, and did not shy away from removing a tablet from its originally intended purpose and inscribing it with a completely different text. This trajectory could go in a number of directions, and quantifications are again difficult without further research; but what we can grasp particularly frequently is the reuse of tablets, in a personal and private context, for letters. This practice showcases the variety of solutions found and decisions made by those wanting to send a message. People used old letter tablets and scratched a new address onto their outside, they dismantled codices, they repurposed seal tablets, and they reused tablet halves, all in order to get, or stay, in contact: wax tablets connected people. This important role of this medium confirms how essential it was for everyday writing, and everyday life, in the Roman provinces – although it is only one of the roles the tablets were able to play, as they moved effortlessly between the personal and the pragmatic, just like Propertius's tablets may have done.

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Abbreviations

AATG = Amt für Archäologie Kanton Thurgau.

BM = The British Museum (registration numbers accessible via Collection Online: <<https://www.britishmuseum.org/collection>> (accessed on 4 August 2024)).

CIL = *Corpus Inscriptionum Latinarum*, Berlin: Reimer / De Gruyter, 1862–.

KAAG = Kantonsarchäologie Aargau.

RIB = Robin George Collingwood et al., *The Roman Inscriptions of Britain*, Oxford: Sutton Publishing / Oxford University Press, 1965–.

RIBonline = *The Roman Inscriptions of Britain online*, <<https://romaninscriptionsofbritain.org/>> (accessed on 4 August 2024).

SH = Hugh Lloyd-Jones and Peter Parsons, eds, *Supplementum Hellenisticum, Indices in hoc Supplementum necnon in Powellii Collectanea Alexandrina confecit H.-G. Nesselrath*, Berlin: De Gruyter, 1983.

Tab.Lond.Bloomberg = Tomlin 2016.

Tab. Tasg. = Hartmann 2011.

TH² = Camodeca 2017.

Tit. Helv. = Kolb 2022.

TPSulp = Camodeca 1999.

WOODAN = *Archaeological Wood Database*, <<https://www.woodan.org>> (accessed on 4 August 2024).

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Serena Ammirati

Some Remarks on the Lexicon of Erasure between Antiquity and Middle Ages

Abstract: Writing, erasing, rewriting. In the ancient and medieval world, the re-use of writing media was a constant habit; this is testified to not only by direct sources (wooden and wax tablets, opisthographic papyri, palimpsest scrolls) but also by the lexicon of literary and documentary texts. This contribution, without any ambition to be exhaustive, discusses some of these references (from Plutarch to Geoffrey Chaucer, via Cicero and the chronicles of the Abbey of Saint Gall) specifically related to ‘erasure’, aiming to identify recurring themes, similarities, and differences across the time period from Antiquity to the Middle Ages.

1 A ‘plane’ recurrence

In the eighth story of Geoffrey Chaucer’s *Canterbury Tales*, ‘The Summoner’s Tale’, the events of a beggar friar in Yorkshire are relayed. Chaucer tells how the protagonist goes about with a set of ivory tablets and a sharply pointed stylus (vv. 77–78: ‘A peyre of tables al of yvory, / And a poyntel polysshed fetisly’) to note down, during the request, the names of benefactors, which are systematically erased, once the alms are obtained, to make room for new ones vv. 94–95: ‘He planed away the names everichon / That he biforn had writen in his tables’).¹ The verb used to indicate the act of erasing, scraping away names, is *to plane*, literally ‘to level, make flat’. It indicates in this way the action of ‘resurfacing’ the wax that most certainly was contained in the hollow of the ivory tablets, so that they could be written on again. The choice of the verb *to plane* seems to hark back to a ‘shared’ lexicon already attested in the early medieval Latin tradition: in the *Ca-*

1 Stallybrass 2006, 556, considers these to be an ivory memorandum book to be inscribed in metalpoint, using some materials from the modern period as a comparison. However, I believe that the possibility it was a wax-covered ivory tablet should not at all be ruled out: examples of this type can be found in the inventory compiled by Lalou 1992, who moreover states: ‘à côté des tablettes de cire “classiques” – bois et cire – existent des tablettes de corne qui étaient elles aussi recouvertes de cire’ (‘alongside the “classic” wax tablets – wood and wax – there were ivory tablets, which were also covered with wax’, Lalou 1992, 234). One curious use, however, which provides further evidence of the widespread use of the practice, is some medieval ivory sundials discussed in Schewe and Davis 2019.

sus Sancti Galli, a chronicle of the Abbey of Saint Gall written on several occasions between the ninth and thirteenth centuries, the section composed by Ekkehard IV (980–1060)² recounts the events of Notker Labeo (c. 950–1022) and his encounters with the devil. In one of them, Satan is seated above him on one of the crossbeams of the ceiling, intent on writing with a stylus on a tablet ('stilo tabulam scribere'); but when Notker questions him about the contents and promptly calls God to his aid, the evil quickly erases it ('manu celerrima quod scripserat planasse').³ Here it is of interest to note the use of the verb *plano* to describe the operation of 'erasure': from the text of the *Casus*, it cannot be discerned whether the *planatio* occurred directly with the hand or in another manner, as seems more frequently attested. The term *plano* is also attested, with the same meaning, at the threshold of Late Antiquity, in Gregory of Tours's *Historia Francorum*: in Book 5, which contains a not particularly enthusiastic portrait of Merovingian king Chilpericus I (535–584), Gregory tells of the sovereign's initiative to introduce new letters into the alphabet, to be taught even to children; and that, for this purpose, the *libri antiquitus scripti* are rewritten to include these new letters, after first being flattened with pumice ('planati pomice rescriberentur').⁴ In this passage, which constitutes – to my knowledge – the earliest attestation of the verb *plano* with a meaning referring to the sphere of (re)writing, the action of erasing seems not to relate immediately to a tablet, as in Chaucer or Ekkehard, but rather indicates a writing medium that can be 'abraded' with pumice: perhaps a parchment to be reused, or a papyrus roll or sheet, whose edges need to be re-sanded? Both are plausible and well attested in the sixth century CE. For both, the action performed by the pumice stone is to 'smooth' or 'polish'. In the case of the palimpsest parchments, a recipe contained in a tenth-century codex from Tegernsee, now preserved in Munich (Bayerische Staatsbibliothek, Clm 18628, fol. 105^v), describes the treatment and 'final touch' given with pumice. The recipe says

Quicumque in semel scripto pergamenio, necessitate cogente, iterato scribere velit, accipiat lac imponatque pergamenum per unius noctis spatium. Quod postquam inde sustulerit, farre

2 *Casus Sancti Galli*,

3 Curiously, Wozniak 2021, 349, reads in the following narrative the throwing of the writing tablet in Notker's direction, thus taking the cue to make, in the following pages, some remarks about the strength of the materials from which the tablets are made. But the *Casus* text explicitly says 'tabula laquearii disrupti', referring to the ceiling tablets. That in the episode the devil is not writing on one of these boards is intuited by the use of the term *trabes* ('laquearii interrupti trabibus diabolum consedissee'), *Casus Sancti Galli*,

4 *Historia Francorum*, 5, 44 – Gregorio di Tours, *Storia dei Franchi*, ed. Oldoni 1981, 532–534.

aspersum, ne ubi siccare incipit, in rugas contrahatur, sub pressura castiget quoad exsicce-
tur. Quod ubi fecerit, pumice cretaque expulitum, priorem albedinis suae nitorem recipiet.

Whoever might need, for whatever reason, to write on a parchment sheet which had already been written, should take some milk and should put the parchment in it for one night's time. As soon as it is taken out, it should be strewn with flour in order that it not be wrinkled after it begins to dry, and so as to be kept under pressure until it dries out. After it is done, the parchment will regain its former quality, shining and lucid [lit. 'the original brightness of its whiteness'], by means of pumice stone [which was often not used] and chalk.⁵

In the case of the papyri, it will suffice to refer to the first poem of the Catullian collection: a 'novum libellum' ('a book just published') is given by the poet to Cornelius Nepos, 'arida modo pumice expolitum' ('just polished with a pumice').⁶ In short, the initiative of Chilpericus is a 'refurbishing' operation with illustrious precedents, in which – as can be seen from the testimonies recalled above, albeit far apart in time – the act of polishing with pumice sanctions the final smoothing. In the case of a parchment, it is of the writing surface ready to be reused; in the case of papyrus, the edges are 'just' re-polished and ready to be delivered to its dedicatee. Considering that the examined passage emphasises the operation of 'rewriting', it seems more reasonable to assume that the *libri* mentioned are parchment codices.

2 Sponging or scratching?

The operation of removing ink on papyri for their reuse must have been easier to achieve than the method for parchment, as the sources attest, using a wet sponge. Edoardo Crisci rightly notes that ancient ink, based on carbon black and vegetable glue to be diluted in water, is very easily removed precisely with water; the sponge must have been part of every scribe's kit, and used for corrections *in scribendo*.⁷ An erasure 'by cleansing' can be found in Ammianus Marcellinus (*His-*

⁵ English translation from András Németh, 'Methods of Removing the Ancient Texts', *Vatican Palimpsests: Digital Recovery of Erased Identities*, Vatican Library, <<https://spotlight.vatlib.it/palimpsests/feature/methods-of-removing-the-ancient-texts>> (accessed on 27 September 2024). The recipe is also found, with some variation, in fol. 36^v of Munich, Bayerische Staatsbibliothek, Cgm 821 (fifteenth–sixteenth century). For this and other recipes mentioned here, I refer to Bartl et al. (eds) 2005, 110–111 and 653–654.

⁶ Catullus, *Carmina* 1, l. 1.

⁷ Crisci 2003, 62–64.

toriae, 15, 5),⁸ where he recounts the conspiracy hatched by the praetorium prefect against Silvanus, *magister peditum* of Emperor Constantius: the contents of some of Silvanus's autograph letters, with the exception of the signature, are obliterated and replaced with entirely dissonant arguments: 'peniculo serie litterarum abstersa, sola incolumi relictasubscriptione alter multum a vero illo dissonans superscribitur textus' ('with a sponge he [i.e. Dynamius] effaced the lines of writing, leaving only the signature intact, and wrote above it another text far different from the original'). A committee of experts, however, manages to discover the deception by discerning *apices* ('traces') of the letters of the *scriptura inferior*: 'contemplans diligentius scripta apicumque pristinorum reliquias quasdam reperiens animadvertit' ('scrutinising the script with greater care, and finding a kind of shadow, as it were, of the former letters').⁹

A recipe, handed down from a papyrus codex in the collection of the Royal Library in Stockholm referable to the fourth century CE (TM 64429), recounts a more complicated procedure, similarly used, as the text itself says, for whitening pearls: water, saltpeter, earth, and milk, mixed until a thick, sticky mixture is obtained, to which mastic juice is added before spreading it on the papyrus; once dry, the mixture can be scraped off and the papyrus will appear as if never written upon. The mixture should be smeared with a feather on individual letters or groups of letters. It is not far-fetched to speculate that this more aggressive procedure might have applied to papyri written with, rather than carbon black, metallic inks, attested as early as the third century BCE and with increasing frequency from the fourth century CE onward. In the recipe the expression used is 'αὕτη δὲ καὶ χάρτας γεγραμμένους πάλιν ψᾶ, ὥσδε δοκεῖν μηδέποτε γεγράφθαι' ('this recipe also erases written papyri to the point of appearing as if they had never been written at all').¹⁰ Sponging must have been, according to Maria Luisa Agati, the most common method of removing ink from parchment as well. And indeed, in the procedure described by Munich, Bayerische Staatsbibliothek, Clm 18628, which closely resembles the standard procedure for manufacturing parchment sheets (bathing the skin in a solution of water and lime and/or milk, tending on a frame, scraping), pumice (and clay) are used not to 'scrape away' the writing but to restore luster to the sheet. Scraping, Agati insists, would have permanently obliterated the lower writing, and also abraded the ink-tainted layer of the *scriptio inferior*, which even in many *codices rescripti* can still be read, even with the

⁸ Ammianus Marcellinus, *History*, tr. Rolfe 1982, 8–13.

⁹ Crisci 2003, 62–64. Ammianus Marcellinus, *History*, tr. Rolfe 1982, 134–135, 140–141.

¹⁰ Betz 1992, no. 110.

naked eye.¹¹ *Codex rescriptus* and *charta rescripta* are the expressions most commonly used in the paleographic and codicological scholarly literature to describe palimpsests, precisely because of the problem that the term, on the practical side, brings.¹² In ancient literary sources, παλίμψηστον (and the verbal counterpart πάλιν ψάω) are not much attested; in the Latin context, *palimpsestum* occurs only twice. In a reply to his friend Trebatius, Cicero (*Familiares*, 7, 18, 2) marvels at having received from him a *chartula in palimpsestum*, a circumstance that the Arpinate attributes to either the sender's parsimony or the lack of new writing material. The lexicon used suggests that the missive was written on papyrus, subjected to 'scraping'. In Poem 22 (Catullus, *Carmina* 22, ll. 4–5), on the other hand, Catullus criticises another poet, Suffenus, for writing many – too many – verses, without resorting to *palimpsest* sheets ('in palimpsesto relata') but instead using each time valuable writerly materials that should be destined, not for texts in draft, but for final publications.

In the Greek sphere, it is Plutarch who uses παλίμψηστον twice, in a metaphorical sense. The first time (*Moralia* 49, 779c)¹³ refers to Dionysius of Syracuse, so 'steeped' in tyranny as a poorly made palimpsest, from which it is impossible to erase all previous traces or stains of writing: 'ἀλλ' εὔρε [scil. Plato] Διονύσιον ὥσπερ βιβλίον παλίμψηστον ἥδη μολυσμῶν ἀνάπλεων καὶ τὴν βαφὴν οὐκ ἀνιέντα τῆς τυραννίδος, ἐν πολλῷ χρόνῳ δευσοποιὸν οὔσαν καὶ δυσέκπλυτον' ('but he found Dionysius, like a book which is erased and written over, already befouled with stains and incapable of losing the dye of his tyranny, since by length of time it had become deeply fixed and hard to wash out').¹⁴ The second instance relates to self-styled talkers who, 'by dint of repeating the same things, wear out the ears of their hearers, as if they were daubing palimpsests' ('οἱ δ' ἀποκναίουσι δήπου τὰ ὦτα ταῖς ταυτολογίαις ὥσπερ παλίμψηστα διαμολύνοντες').¹⁵ In both passages, the noun παλίμψηστον and verb μολύνω, or their derivatives, recur: in *Moralia* 49, 779c, the metaphor is clear, and the palimpsest is a writing medium (a papyrus? So the term βιβλίον would suggest) deeply stained and difficult to clean completely; however, in *Moralia* 35, 504d, the idea of 'reuse' is hardly perspicuous, and neither is that of 'stain', as the translator rightly notes in the commentary: 'Plutarch probably means that talkers wear out our ears by the repetitions of stale

¹¹ Agati 2009, 75–76.

¹² Lowe 1965.

¹³ Plutarch, *Philosophers and Men in Power*, tr. Helmbold 1939, 47.

¹⁴ Plutarch, *That a Philosopher Ought to Converse Especially with Men in Power*, tr. North Fowler 1936, 46–47.

¹⁵ *Moralia* 35, 504d – Plutarch, *Concerning Talkativeness*, tr. Helmbold 1939, 411.

news, just as palimpsests are worn out by constant erasure. But not all points of the comparison are clear'.¹⁶ Indeed, the verb used – διαμολύνοντες – has to do with the concept of 'stain', not that of 'erasure'. The comparison, in short, is not straightforward, but the use of the words appears not without interest: the palimpsest is stained and is, therefore, δυσέκπλυτον ('difficult to wash') – which brings us back to the operation of 'sponging' mentioned earlier. Even in their paucity, the four sources considered so far report quite different situations and reveal considerable familiarity with the idea of ink rewriting of likely papyrus media, although not always with acceptable results.

3 *Stilum ducere, stilum vertere*

The erasable medium par excellence is the wax tablet rather than papyrus, and it is with a return to tablets that I would like to close this brief survey.

Quintilian's words (*Institutio Oratoria*, 10, 3, 31: 'scribi optime ceris, in quibus facillima est ratio delendi') about the appropriateness of using wax tablets as a writing medium are very well known. Text inscribed on tablets it is very easy to erase and thus correct while writing.¹⁷ Wax is engraved using a pointed instrument, a stylus, made from various materials (wood, bone, metal), some of which – such as iron and bone – were eventually subject to restrictions because they could have been used as weapons. The stylus has a pointed tip, while the opposite side usually ends in a spatula, for scraping the wax; hence the expression *stilum vertere*, indicating the gesture of turning the writing instrument (similar to how we use pencils with erasers today) to make tiny corrections or wider erasures. These two meanings we find in Horace, *Sermones*, 1, 10, ll. 72–73: 'Saepe stilum vertas, iterum quae digna legi sint scripturus' ('Often you must turn your pencil to erase, if you hope to write something worth a second reading');¹⁸ and in Cicero, *In Verrem*, 2, 2, 101: 'Cum haec

¹⁶ Plutarch *Concerning Talkativeness*, tr. Helmbold 1939, 410.

¹⁷ Quintilian, *The Orator's Education*, tr. Russel 2001, 350–351. *Delere* is still the verb used by Fratrī Felici Fabri in his *Evagatorium in Terrae Sanctae, Arabiae et Egypti peregrinationem*: 'Ego in hoc valle rescripsi paene totum iter a Gaza usque huc; scripseram enim sedeus in asino dispositiones et habitudines regionum et viarum in tabula de cera, quam cingulo portavi et ibi totum in libello rescripsi et de cera deleui, ut consequenter alia scriberem' ('I recorded almost the entire journey from Gaza to here in writing. While sitting on the donkey, I had noted the location and nature of the landscapes and paths on a wax tablet that I carried on my belt, and then I wrote the whole thing in a booklet and erased the wax tablet so that I could write down something else'; my emphasis and translation). See Wozniak 2021, 370.

¹⁸ Horace *Satires*, tr. Fairclough 1926, 120–121.

ad istum afferrentur, pertimuit aliquando et commotus est; vertit stilum in tabulis suis, quo facto causam omnem evertit suam; nihil enim sibi reliqui fecit quod defendi aliqua ratione posset' ('When this news reached Verres, he was at last thoroughly frightened and upset; and then he applied the blunt end of his style to his records, thereby making an end of all his chances of acquittal, for he has left himself no loop-hole for any sort of defence').¹⁹

The expression, which indicates the 'retroverted' movement of the stylus, is still found more than three centuries later in a much-discussed passage of St Jerome's Vulgate, and ends up having the same meaning as the one that properly indicates the act of writing, *stilum ducere*.²⁰

In 2 Kings 21:13, the original Hebrew text reads 'I shall wipe Jerusalem as a man wipes a *dish*, wiping it and turning it upside down' (my emphasis). In the Hieronymian version, however, the text reads 'I shall wipe Jerusalem just as *tablets* are wiped smooth, and I shall turn it as I wipe, *and shall rub the stylus across its surface repeatedly*' (my emphasis; in Latin: 'et delebo Jerusalem sicut deleri solent tabulae; *et delens vertam, et ducam crebrius stylum super faciem eius*'), with the addition (here italicised) that makes perspicuous the presence of waxed tablets rather than tableware, but that also paradoxically recodes the expression *stilum ducere* to mean the process of 'erasure' of the tablet.

In this apparent short circuit we see once again, in my opinion, the familiarity, custom, and continuity in the gestures of writing and even in the movements themselves: a process in which conservatism in the use of certain media (above all, waxed wooden tablets) is paralleled by conservatism in the lexicon.

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¹⁹ Cicero, *The Verrine Orations*, tr. Greenwood 1928, 400–401.

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From Wax Tablets to Codices: The Possible Influence of the Stylus Holder on the Structure of Early Multi-gathering Codices

Abstract: Writing tablets, which were commonly used in Antiquity, are presumably one of the predecessors of the multi-gathering papyrus or parchment codex book form. This paper summarises the features that wax tablet codices and multi-gathering codices share; analyses the available iconographic evidence to identify a presumed leather accessory for carrying metal styluses along with wax tablet codices; and proposes a reconstruction of this accessory. Finally, it hypothesises that the accessory might have been the inspiration for an awkward early book-binding structure, found in most of the multi-gathering parchment codices of the period between the fourth and seventh centuries CE that have survived more or less intact to the present day.

1 Introduction

Writing tablets, made primarily of wood, waxed, whitewashed, or just left plain, single, double, or multiple, are known to have been used almost continuously from the second millennium BCE up to even today in certain parts of the world.¹ They were used extensively in the Greco-Roman world – known as *tabulae* (*cera-tae* if waxed) or *caudexes* (i.e. codices) when several were connected together² – for various purposes, mostly as devices for drafting; information recording, transmitting, and archiving; schooling; or simply as notebooks. Besides being an object of interest in and of itself, as one of the different devices used historically to record information, the wax tablet codex in particular seems to have played an important role in the crafting of multi-gathering codices in both papyrus and parchment – the main book form still in use today – in the early centuries CE. Furthermore, iconographic evidence of wax tablets can provide clear and important evidence of features which so far have not been identified among the

¹ See Andrea Brigaglia and Dahir Mu'az's contribution to the present volume.

² The terms were synonymous already in third-century BCE Rome; see Roberts and Skeat 1983, 11–14.

physical remains of writing tablets found in Egypt and Europe. Such evidence might actually hold the key to understanding some intriguing features of the way early multi-gathering codices were bound.

2 Previous research and literature

Tablet codices together with the rest of the writing implements used in Greco-Roman Antiquity have attracted considerable attention in recent years, mostly, as expected, for their content.³ Although we usually associate surviving writing tablets from Antiquity with Egypt, as several were preserved there due to the dry climate, hundreds of Roman writing tablets have also been found in several locations in Europe, such as Pompeii and Herculaneum in Italy, Tasgetium (modern Eschenz) and Vindonissa (modern Windisch) in Switzerland, and Vindolanda and London in the United Kingdom, among others.⁴ Benjamin Hartmann has produced convenient maps of the geographical distribution of forty-four sites in Europe and North Africa where wax tablets have been found, together with the number found in each.⁵ Attention has also been paid specifically to styluses used to write on wax tablets⁶ and the rest of the writing implements used in the Roman world,⁷ as well as their representation in art,⁸ as we will consider in more detail later in this article.

3 Several articles consider individual tablets or small groups of tablets. See e.g. Pintaudi and Sijpesteijn (eds) 1988. For more general discussion see e.g. Willi 2021; Ammirati 2013; Meyer 2004, 24–36; Criboire 1996; and the various contributions in Lalou (ed.) 1992. On the influence of wax tablets in the making of papyrus and parchment codices in Late Antiquity, see Boudalis 2018, 21–34. On Greek and Roman literary sources about tablets, see Degni 1998. On the earliest history of wax tablets in the ancient Near East, see Cammarosano et al. 2019.

4 For an overview of the literature on the subject, see Michele Cammarosano's contribution to the present volume.

5 Hartmann 2011; Hartmann 2015.

6 Schaltenbrand-Obrecht 2012; Willi 2021, 32–38.

7 Willi 2021.

8 Grill 2023; Meyer 2009.

3 The various types of wax tablet codices

Wax tablets were very adaptable as far as size and use were concerned. They must have been everywhere in Roman Antiquity, used by everyone from laymen and craftsmen, to tradesmen, teachers, and students, to bureaucrats, emperors, and queens. Besides the tablets themselves, the hundreds of surviving styluses provide good proof of how widespread wax tablets were in Roman times.⁹ The tablets consisted of rather thin slabs of wood (occasionally ivory, even onyx or rock crystal)¹⁰ with a recessed surface on one or both sides, where wax, usually coloured black or red, was poured and distributed, possibly using a metal spatula, the same tool used to scrape the wax out of the recessed surface when one wanted to change the old wax with fresh one.¹¹ Using a metal or ivory stylus, one could write on the surface by incising letters with its pointed end and, when a correction was necessary, the other, flat, end of the stylus acted as a spatula to level the wax, and thus erase the writing. Surviving wax tablets have been categorised as mainly school tablets, legal tablets, or account tablets,¹² although tablet codices, used in the way notebooks are used today, were also common.

School tablets usually took the form of wax tablet codices, but single plain tablets are also known to have been used for this purpose.¹³ The writing was typically oriented parallel to the long sides, and thus the connection between the tablets – usually achieved through two holes threaded with some connecting material such as cord, or leather thongs – was also along one of the long sides, what we call the *spine*. Therefore, when used, they had a horizontal rather than vertical orientation; individual tablets opened and closed at the top, as we do today with laptops, rather than like books, which are opened to the left (for languages written from left to right) (Fig. 1).¹⁴

⁹ Schaltenbrand-Obrecht 2012.

¹⁰ Plutarch (46–after 119 CE), in his *Life of Mark Antony* (83–30 BCE), recounts how he ‘would receive love-billets from her [Cleopatra] in tablets of onyx or crystal’ (‘δελτάρια τῶν ἐρωτικῶν ὀνύχινῃ καὶ κρυστάλλινῃ δέχεσθαι παρ’ αὐτῆς καὶ ἀναγινώσκειν’; Plutarch, *Life of Antony*, 58.6, tr. Perrin 1920).

¹¹ For these spatulas, see Willi 2021, 76–79. Herondas (third century BCE), in his *Mimes*, mentions ‘the wretched tablet, which I tire myself out waxing each month’ (‘κῆ μὲν τάλαινα δέλτος, ἦν ἐγὼ κάμνω | κηροῦς’ ἐκάστου μηνός’; Herondas, *Mimiambi*, 3, 14–15, ed. Cunningham 1971). Mentioned in Willi 2021, 114.

¹² Meyer 2007.

¹³ Criboire 1996. On plain wood school tablets, see Criboire’s cat. nos 333, 364, and 385. On school wax tablet codices, see also Meyer 2007, including Appendix 1.

¹⁴ There is plenty of iconographic evidence from Greco-Roman Antiquity showing exactly this way of using tablets. See e.g. the famous ‘school’ cup of the Duris painter, dated 480 BCE, now in Berlin, Staatliche Museen zu Berlin, Antikensammlung, inv. no. F 2285, <<https://id.smb.museum/object/686551/>> (accessed on 17 June 2024).



Fig. 1: Terracotta figurine of a boy writing with a stylus on a diptych from Boetia, Greece, around 500 BCE; © Paris, Musée du Louvre, inv. no. CA 684.



Fig. 2: Detail from a statue of Calliope, muse of epic and heroic poetry, holding a diptych. Roman work after Greek models of the third–second century BCE, Saint Petersburg, Hermitage Museum, inv. no. ГР-4177 (A 384). Photograph by the author.

Account wax tablets were used for recording financial transactions – amounts of money received or spent, payments, expenses, and so on – with the text written parallel to the short sides. They are clearly distinguished from the other types of tablets by the fact that they are usually connected to each other through two pairs of holes arranged along the long sides of the tablets, with one pair of holes placed near either end of the spine.¹⁵ This characteristic arrangement of the sewing holes – which makes it plausible that each pair was sewn independently from the other – is also typical of several of the earliest papyrus and parchment codices that have

¹⁵ On account wax tablet codices, see also Meyer 2007, including Appendix 2.

survived in one way or another, and it is furthermore often very clearly represented in images of early codices in late antique Christian art.¹⁶

Legal tablets were used to record different types of legal agreements, such as wills, birth records, marriage contracts, heritage acceptances, and edicts. They were constructed in a particular way which allowed the original text (written parallel to the long sides) to be safely secured with one or more seals, while a summary of the legal text contained inside was written on the outside, parallel to the short sides. Several representations of such legal tablets as well as physical examples have survived.¹⁷ They were usually connected through two or three holes distributed along their spine.

It is interesting to note that different types of tablets had different numbers and distributions of holes for connecting them together, although it is not easy to say why. The only thing that seems clear is that tablet codices with two or three pairs of sewing holes arranged along the spine had a much stronger connection between the individual tablets.

The wood used to make wax writing tablets varied, often reflecting what was available in the area of construction. For example, among the fifty-three tablets found in Tasgetium, thirty were made of silver fir (*Abies alba*), nineteen of spruce (*Picea abies*), two of maple (*Acer spicatum*), and one of beech (*Fagus sylvatica*).¹⁸ Several literary sources specifically mention boxwood (*Buxus sempervirens*),¹⁹ but also cedar (*Cedrus sp.*) and lime (*Tilia sp.*), among others. Martial also mentions tablets made of citron wood (*pugillares citrei*).²⁰

Wax tablet codices were composed of a number of individual tablets connected together in different ways. According to the number of tablets of which such a codex was composed, it was called a diptych (Figs 2 and 3), triptych, or polyptych, if composed of two, three, or several tablets, respectively. Examples of as many as eight,

¹⁶ The sewing stations arranged in two separate set of two sewing holes are for example found in nine out of the twenty codices listed by Brent Nongbri as belonging to the Bodmer papyri, see Nongbri 2018, 170–175, and Boudalis 2018, esp. 26–39, 63–65.

¹⁷ On Roman legal wax tablets, see Meyer 2004. For very informative drawings showing the structure of these tablets, see Tomlin 2016, 24, fig. 17. For a wall painting from Pompeii showing a sealed wax tablet, see the detached wall painting Naples, Museo Archeologico Nazionale di Napoli, inv. 4675, reproduced in Willi 2021, 11, fig. 2 (top). See also Meyer 2007, including Appendix 3, listing thirty-seven physical examples.

¹⁸ Hartmann 2011, 126.

¹⁹ It is interesting that the word *πυξίον* is the Greek name of ‘boxwood’ but also the word for a ‘single tablet’ or a ‘codex’. See Degni 1998, 66–67. Boxwood was also used for the Uluburun diptych; see Warnock and Pendleton 1991.

²⁰ Martial, *Apophoreta*, 3, 5, ed. Leary 1996, 29, 58.

and even more tablets, are known from archaeological finds, and others with as many as thirteen tablets are known from iconographic evidence.²¹ In all cases, the functional aspects of wax tablet codices, whether diptychs, triptychs or polyptychs, were exactly the same, based on the simple principle of connecting the tablets along their spines. The physical evidence that survives, as well as the functional aspects of these codices, seems to indicate that the standard practice would have been to connect the leaves through some kind of sewing with thread or lacing with leather ties.²² Very few connecting methods are fully or even partly preserved in the extant codices. A rare example is the farm-account tablet codex from Kellis dated to around 360 CE (Fig. 4).²³ In the best cases, we can infer the use of some sort of sewing material through the wear marks left on the wood in relation to the sewing holes. This is, for example, the case with codex MND 552 from the Louvre in Paris, dated between 307 and 425 CE.²⁴ The presence of cuts along the spine of the tablets, aligning with the sewing holes in several examples, also suggests the use of thread, which would sit in these cuts, thereby providing a more stable and sturdy structure.²⁵ In other cases, the preserved holes on the codices can indicate other methods of connection. Although no example of sewing from the more elaborate wax tablet codices have survived, a few possible methods have been proposed (Figs 3, 5, and 6) which are often accurately represented in art (Fig. 7).²⁶

²¹ For a seven-tablet codex from third century BCE, see Petrie 1927, cat. nos 70–73, plate 59; and for an eight-tablet codex reconstruction based on the original codex from the first century CE found in Herculaneum, see Boudalis 2018, 25, fig. 11. Capasso 1992, 222–225, also mentions an example of a twenty-four wax tablet codex found in Herculaneum in the mid eighteenth century which was subsequently lost. A ten-tablet codex is represented in a stele from the second century CE from Bourges, France (Cavallo 1992, 103, fig. 3), and a thirteen-tablet codex is found in the third/fourth-century CE wall painting of the Trebians Iustus tomb in Via Latina (Rea 2004, 62, fig. 41). In the ancient Near East, the attested maximum number of leaves is twelve; see Cammarosano et al. 2019, 146.

²² Metal rings are also mentioned from time to time by scholars as a means for connecting the various tablets together into a codex, but I am unaware of any physical example of such rings from the Greco-Roman period, preserved on tablet codices. In practical terms, metal rings must not have been a very satisfactory solution compared to sewing, as the connection between the tablets would have been loose. Instead, metal rings were used to connect together the two bronze tablets in Roman military diplomas. See for example <<https://www.thehistoryblog.com/archives/69461>> (accessed on 16 March 2025).

²³ Bagnall (ed.) 1997.

²⁴ Paris, Musée du Louvre, inv. no. MND 552, <<https://collections.louvre.fr/en/ark:/53355/cl010305604>> (accessed on 17 July 2024). For an interpretation of such marks, see Boudalis 2018, 27–29.

²⁵ See for example the wax tablet codex of Theophilos, son of Martyrios, at the Brooklyn Museum with accession numbers of its five tablets: 37.473E, 37.1909E, 37.474E, 37.1910E, and 37.1908E. Also considered in Boudalis 2018, 24–29.

²⁶ Boudalis 2018, 25, 29, figs 9–11, 14–15.

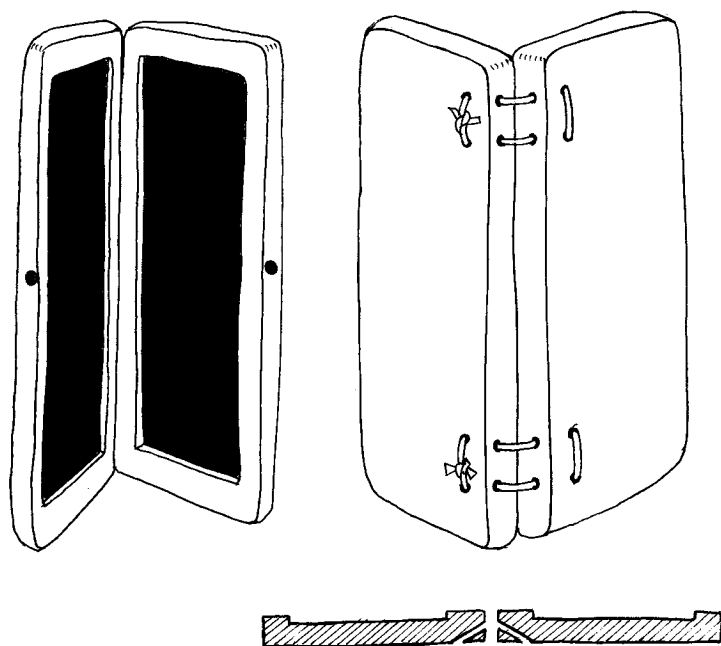


Fig. 3: Reconstruction of a diptych after Schubart 1907, from Boudalis 2018, 25, fig. 10.

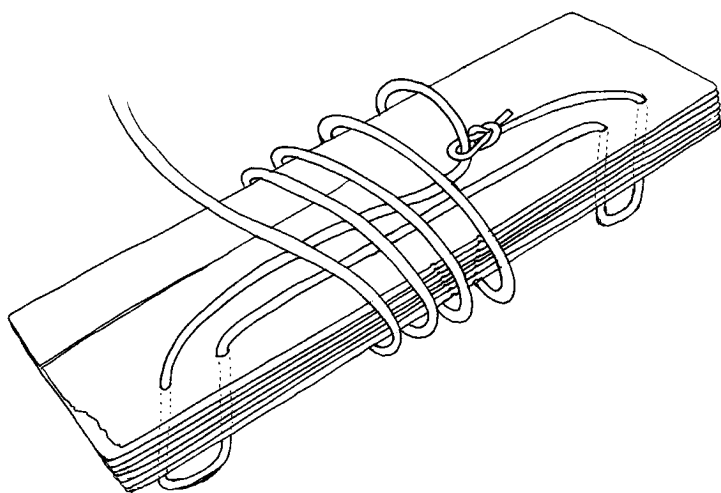


Fig. 4: Reconstruction of an account tablet codex found at Kellis in the Dakhleh Oasis, c. 330 CE; from Boudalis 2018, 25, fig. 9.

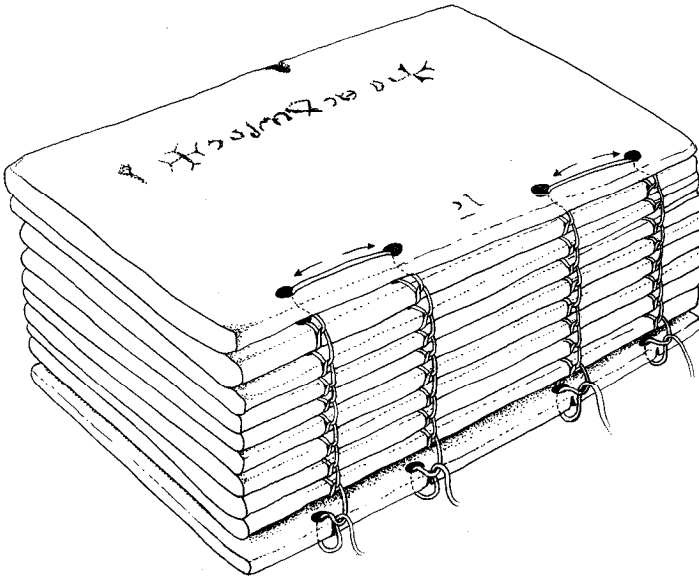


Fig. 5: A possible reconstruction of the Theodoros Codex from Fayyūm, seventh century CE; from Boudalis 2018, 29, fig. 15.

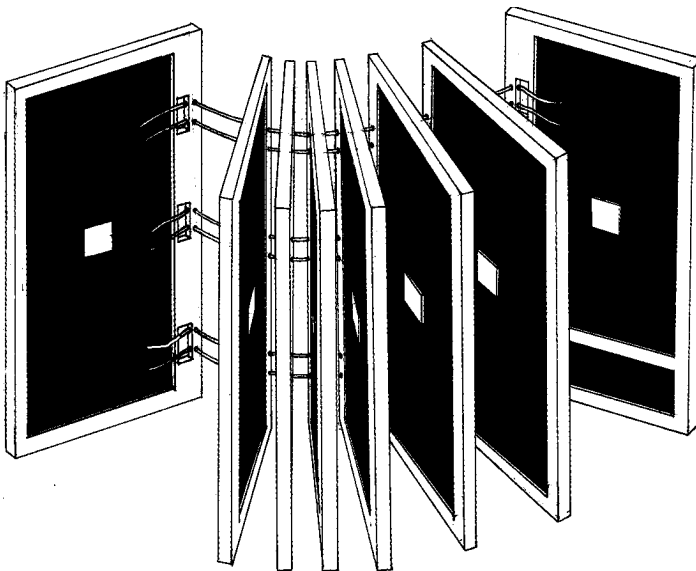


Fig. 6: Reconstruction of a wax tablet codex with eight tablets found in the House of the Bicentenary in Herculaneum, third quarter of the first century CE; from Boudalis 2018, 25, fig. 11.

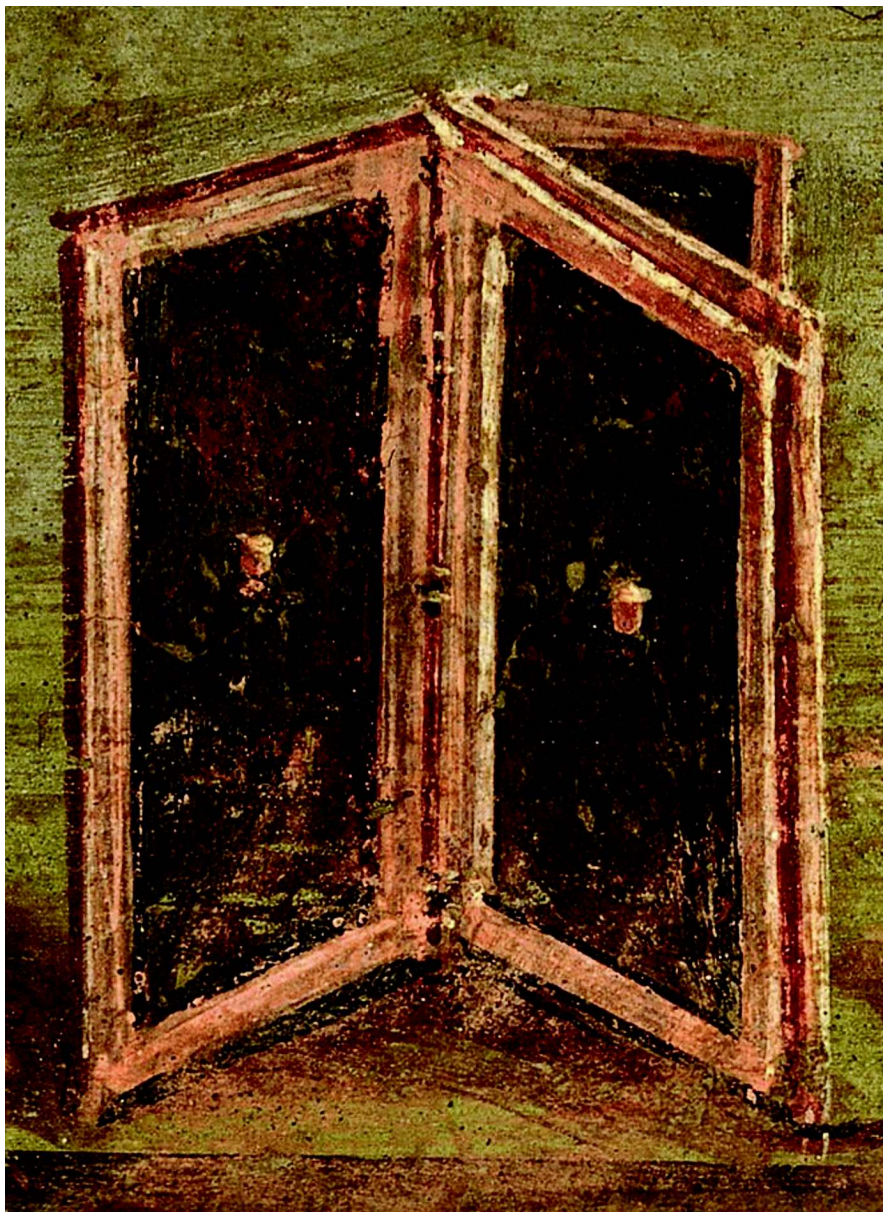


Fig. 7: Detail of a wall painting showing a four-tablet wax tablet codex, from the House of Fabius Secundus, Pompeii, first century (before 79 CE), Naples, Museo Archeologico Nazionale, inv. no. 4676.

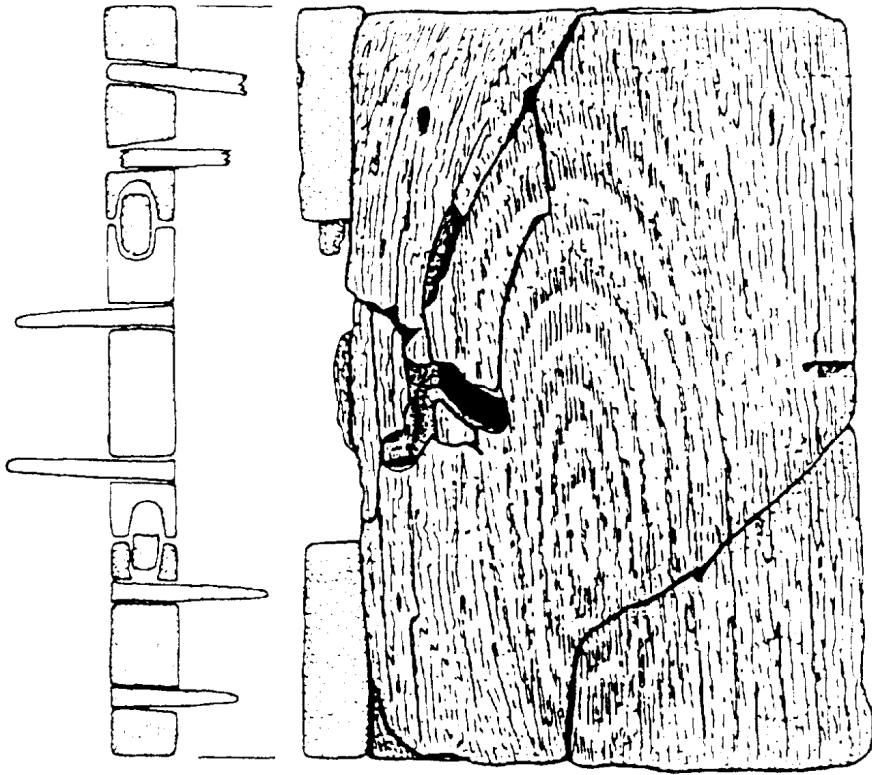


Fig. 8: The Uluḫurum diptych, fourteenth century BCE; drawing by Netia Piercy; from Payton 1991, 102, fig. 2.

Despite the methods illustrated in Figs 5–7, which seem to have been common at least in Roman times, the earliest extant examples of wax tablets show an altogether different method of connecting the individual tablets. This consisted of cylindrical hinges attached to the tablets in a way that allowed them to open and close with precision. This is the method used in the Uluḫurum diptych from the fourteenth century BCE²⁷ (Fig. 8) and an ivory diptych from Assur probably dated to the eighth century BCE.²⁸ Iconographic evidence from a third-century BCE tomb from Thebes in Greece clearly shows a diptych with a similar hinge mechanism (Fig. 9). The representation is rather accurate and there is no reason

²⁷ For the Uluḫurum diptych, see Payton 1991, with additional data in Cammarosano et al. 2019, 148–150.

²⁸ For a reconstruction of this tablet, see Jendritzki, Streckfuss and Cammarosano 2019, 2–19.

to suggest that it does not show an actual diptych of that time and place, despite the fact that we lack any physical evidence of such a tablet codex structure from ancient Greece.²⁹ A similar mechanism is used in the small (9 × 12 cm), metal, so-called Basilides Codex, broadly dated to Late Antiquity and now preserved in the Museo Epigrafico del Museo Nazionale Romano, Terme di Diocleziano in Rome (inv. no. 65036),³⁰ but also in other objects, such as a ‘box double mirror’ held open by a female figure on an Etruscan urn at the Louvre, dated to the third quarter of the first century BCE.³¹

Although wax tablets, either single, double, or multiple, were very common in Greco-Roman Antiquity, non-waxed wooden tablets were also used. These could vary from the thin wooden *tiliae* (usually thin wood-leaf ‘tablets’ on which one would write with ink, used for ephemeral texts of all sorts, such as letters), to bigger and thicker wooden tablets, used in either single or multiple, on which one could also write with ink.³² The latter could be left plain or covered with a white layer, and thus often called *album*, meaning ‘white’ in Latin. Martial also refers to *pugillares* (tablets small enough to be held with the palm; Fig. 2)³³ made of ivory, on which one could write with ink, which presumably could be erased (with water?) when necessary.³⁴ We should also here mention the *tabulae publicae*, that is, the large wooden wax tablets used by the Roman bureaucracy for administrative and archival purposes. Although there must have been thousands of these in Rome alone, and of course in all major provincial administrative centres, where they would be housed in the state *tabularia* (i.e. the public archives), not a single example or even fragment of such a tablet seems to have survived. Our only visual information about these are some Roman marble reliefs of the first and second centuries CE.³⁵

²⁹ See Charami 2024.

³⁰ Grill 2023, 108, fig. 7.

³¹ Paris, Musée du Louvre, inv. no. CC 104; Ma 2356.1, <<https://collections.louvre.fr/en/ark:/53355/cl010303295>> (accessed on 28 October 2024).

³² On writing with ink and brush in Roman times, see Fioretti 2012; Willi 2021, 45–49.

³³ *Pugillaris* meaning ‘the one that can be held in the palm’.

³⁴ Martial, *Apophoreta*, 14.5, ed. Leary 1996, 29, 60–61.

³⁵ On this topic, see Hartmann 2020, 40, 42, 50, 118, figs 2.1, 2.2, 2.3, and 5.1.



Fig. 9: Detail from the painted decoration of a tomb showing a diptych, Thebes, Greece, third century BCE. Photograph by the author; cf. Charami 2024.

4 Are wooden tablets and papyrus or parchment multi-gathering codices related?

The idea that the multi-gathering papyrus or parchment codex evolved from the wax tablet codices is based primarily on the structural and functional similarities of the two book forms and has been commonly accepted among scholars. Both forms are composed of leaves (made of wood in one case, and of papyrus or parchment in the other), which are connected together along their spine in a way that allows them to be turned, so as to enable writing on both sides of the leaves. The most prominent objection to this view comes from János Szirmai, who wrote

arguably the most influential work on bookbinding history of the late twentieth century. His scepticism, though largely respected due to his status rather than the strength of the argument, has not halted recent research affirming the close relationship between wax tablet codices and their papyrus and parchment counterparts.³⁶ Despite Szirmai's scepticism, recent research seems to indicate that wax tablet codices and papyrus or parchment codices are in fact closely related. An exhibition at Bard Graduate Center, New York, in 2018, and the accompanying catalogue, under the title *The Codex and Crafts in Late Antiquity*, investigated this connection primarily on a technical basis, identifying specific affinities in materials and techniques. It is thus now understood that these two codex forms are indeed directly related and their connection, according to our current knowledge, can be identified through the following four factors.

(1) *The name itself.* The word *codex* derives from the Latin *caudex* (meaning 'tree trunk' or 'tree stem'), which first designated a number of wooden tablets fastened together, also called *tabulae*.³⁷ The fact that the word was subsequently used to designate the 'new' book form of the papyrus or parchment codex (either single-gathering or multi-gathering) is straightforward evidence of the close relation of the two codex forms. Martial, in his *Epigrams*, mentions *pugillares* made out of wood, ivory, and parchment; that is to say, he used the same name whether the leaves were made of parchment, ivory, or wood.³⁸

(2) *The writing on both sides.* In both codex forms, text is written on both sides of the leaves, whether these are rigid wooden tablets or pliable papyrus or parchment folios. By contrast, writing on papyrus rolls in Greco-Roman Antiquity was limited to only one of the two sides, the so-called *recto*. Except for school tablets and the inner text of legal tablets (where the text was often written parallel to the long sides), most wax tablet codices feature text written parallel to the

³⁶ See Szirmai 1990, 31: 'The certainty with which the validity of this statement is taken for granted is in marked contrast with the lack of any substantial evidence or exploration as to the exact nature of this genetic relationship. Yet the assumption is being repeated again and again without any sign of intellectual discomfort about the weakness of the argument. A semantic shift in a word cannot be taken as proof of genetic relationship. The analogy in the geometrical shape of the composing elements or of their ability to be turned along one side is merely superficial; the primitive methods of connecting the elements of the writing tablets (using hinges, metal rings or lacing) have scarcely anything in common with the codex structure'. It should also be noted here that Szirmai interprets as a codex what are most likely wax tablets in the Luwian stela of Tarhupiya; see Cammarosano et al. 2019, 134, n. 126. The same ideas are found in Szirmai 1999, 3–4.

³⁷ 'Caudex ob hoc ipsum appellatus, quia plurium tabularum contextus caudex apud antiquos vocatur' ('among the ancients a structure formed by joining together several boards was called caudex'; Seneca, *De Brevitate vitae*, 13–14, tr. Basore s.a.). See Willi 2021, 132.

³⁸ Martial, *Apophoreta*, 3, 5, 7, ed. Leary 1996, 29–30, 58, 60, 62; Willi 2021, 119.

short sides, as is also the case with papyrus and parchment codices.³⁹ The proportions of the earliest multi-gathering codices (i.e. the relation between their long and short sides) seem to correspond to the form of the wax tablet codices, especially the legal tablet codices.⁴⁰

(3) *The mechanics of page turning.* On a technical level, the connection between the wax tablet codices and that of the papyrus and parchment codices is so close that the latter can be considered an innovation rather than an invention.⁴¹ In both codex forms, the mechanism that permits the book structure to function as such is the same, based on hinging the leaves along their spines.

(4) *The sewing of the leaves.* As has been extensively discussed elsewhere,⁴² the sewing of the multi-gathering codices seems to have at least partly followed the methods used for the wax tablet codices. Although we cannot say much about the exact sewing method used – as nothing of it has been preserved in the extant wax tablet codices – the general arrangement of the sewing holes, single or especially in pairs (usually two sets of two holes each arranged along the spine), provide evidence of similarity. These holes are consistently found both on account wax tablet codices and on multi-gathering papyrus or parchment codices of the early Christian centuries. Likewise, the use of the stab sewing (common among early papyrus codices), rather than sewing through the fold, seems to be another feature passed directly from one form to the other.⁴³

5 Iconography and the issue of the stylus case

The use of iconography to reconstruct aspects of the material culture of the past is one of the most fascinating aspects of research, as it combines art history and archaeology. This approach is especially useful for items which, for one reason or another, have left very few, if any, physical remains, although they might have been very common at the time they were in use. Books of different forms in Greco-Roman and late antique times, mainly because of the organic materials from which they were made, represent a class of material culture objects that is

³⁹ Meyer (2007) considers that this orientation of the text in papyrus and parchment codices was copied from legal tablet codices, where a summary of the text protected and sealed within was written on the outside parallel to the short sides.

⁴⁰ Meyer 2007, 307, fig. 7.

⁴¹ Boudalis 2018, 6.

⁴² Boudalis 2018, 21–31, 49–65.

⁴³ On these rather technical issues, see Boudalis 2018, 49–68.

well represented in Greco-Roman art from roughly the fifth century BCE to the sixth century CE but which has left only fragmentary physical remains. The latter part of this broad period, the Imperial Roman and early Christian centuries, is of major importance to the history of the book, as it is in this period that the transition from rolls to multi-gathering papyrus and parchment codices took place.

Representations of books, either in roll or wooden tablet codex form, are common in Greco-Roman art, especially in certain media, periods, and iconographic contexts. For example, school tablets are commonly represented in Attic red-figure pottery of the fifth and fourth centuries BCE in scenes related to schools, students, and teaching (see Fig. 10).⁴⁴

Likewise, terracotta figurines of the fifth or second century BCE from Boetia in Greece show students writing on wax tablets (Fig. 1).⁴⁵ Although such representations seem to be very realistic, the lack of physical remains from the same time and place prevents us from verifying the degree of their accuracy.⁴⁶ In the Roman period, the amount and accuracy of such iconographic evidence increases rather dramatically, both in wall paintings and sculpture. Contrary to Elizabeth Meyer's scepticism regarding the usefulness of such representations,⁴⁷ they have regularly proven to be very accurate and valuable. An especially well-known and rather well-studied group of such evidence are the wall paintings from Pompeii and Herculaneum, where writing implements and different types of codices are often represented in still lifes and as part of both realistic and allegorical portraits.⁴⁸ One of the most interesting, and certainly one of the most widely reproduced, representations of a wax tablet codex is that in the so-called 'Sappho' portrait from Pompeii, now in the Museo Archeologico Nazionale in Naples (Fig. 11a).

⁴⁴ Gkanidou 2018.

⁴⁵ See e.g. Paris, Musée du Louvre, inv. nos CA 684, CA 2160.

⁴⁶ The only wax tablet codices to have survived from ancient Greece are those found in the so-called poet's tomb dated to 430–420 BCE. Five wax tablets were found in the tomb, four belonging to the same small wax tablet codex, while the fifth is a single tablet. The wax used was found to be yellow and red. See West 2013.

⁴⁷ Meyer 2009, 584: 'it is unwise to conclude anything about actual habits of reading and writing or composing from any of these "portraits"'.

⁴⁸ For a detailed discussion of this evidence, see Meyer 2009. For similar evidence in sculpture, see Grüll 2023 and the 'Scroll in Hand' project, which aims to collect evidence of scrolls and other writing implements from Roman funerary monuments: <https://scrollinhand.hu/?page_id=905&lang=en> (accessed on 28 October 2024).



Fig. 10: Detail from a terracotta kylix from Attica, Greece, showing two schoolgirls, 460–450 BCE;
© New York, NY, Metropolitan Museum of Art, inv. no. 06.1021.167.



Figs 11a–b: (a) Portrait of a woman known as ‘Sappho’, from Pompeii, Insula Occidentalis, 50–70 CE; © Naples, Museo Archeologico Nazionale, inv. no. 9084. (b) Detail of Fig. 11a: spine of the tablet codex with the stylus case.

In the ‘Sappho’ image, the woman is shown holding a closed wax tablet codex composed of four tablets. She holds a metal stylus with her right hand, with the sharp end touching her lips, in a gesture still familiar to us all today, a gesture which indicates thinking or daydreaming.⁴⁹ The spine of the codex she holds is clearly shown as having a dark-grey appendage with two holes at the top, one of which holds a second stylus with its flat end pointed upwards; the second hole would no doubt be used for inserting the stylus the woman holds in her hand. The appendage is presumably a stylus case, a leather sheath with a cover, shown hanging backwards. This stylus case would have been attached somehow to the spine of the wax tablet codex and would be used to keep the codex and the styluses together without risking dropping or losing them, or being wounded by their sharp ends.⁵⁰ The need and habit to secure and

⁴⁹ For images of women holding the stylus in the same way, see Meyer 2009, 585, figs 18b and e–g, 20. Also see Schaltenbrand-Obrecht 2012, 35, figs 23–24.

⁵⁰ Styluses made of metal and having a sharp end could no doubt potentially be dangerous. Suetonius, writing about the life of Claudius, says that Claudius was so suspicious that he would have the cases of pens and styluses taken from every attendant or scribe that would come close to him. See Suetonius, *Life of Claudius*, ed. Rolfe 1914, 35. St Cassian, who was a teacher in Imola in

carry the stylus(es) together with the tablet(s) is well attested in many images in Attic pottery of the fifth to fourth century BCE, representing students carrying their wax tablets to and from school, and often showing the tablets wrapped with a string, securing not only the tablets but also the styluses (Fig. 10). The same might be attested by the phrase ‘τὶνι πινακίδα καὶ γραφεῖον ἐξηρητημένον ἔχοντ’ (‘having a tablet and an attached stylus’) in the collection of anecdotes *Χρειαί*, written by the third-century BCE playwright Machon and preserved in Athenaeus’s *Deipnosophistae*.⁵¹ Additionally, some wax tablet codices feature an outermost tablet with an appropriately sized recess for holding the stylus.⁵² Martial mentions stylus cases, and calls them *graphiaria*.⁵³

Although the presence of the tablet and stylus is always mentioned when this specific portrait from Pompeii is described, the very clear and precise detail of the stylus case is usually completely neglected.⁵⁴ So far, only two other representations showing a similar stylus case have been identified in paintings. These are an open wax tablet codex in a wall painting from Herculaneum (MN 466C; Fig. 12)⁵⁵ and probably also a long strap extending from the spine of an open wax tablet codex on a wall painting fragment from the theatre of Nemi outside Rome (Fig. 13).⁵⁶

the fourth century CE, was condemned to death and killed by his students, who bound him and stabbed him to death with their metal styluses.

51 It is possible that the phrase might also mean that the tablet and stylus were attached to the person for carrying around, rather than the stylus being attached to the tablet, although it should be noted that we have no iconographic evidence of tablets been appended (hung or otherwise secured?) on someone’s body—the artisan statuette from the Metropolitan Museum of Art, for which see n. 67 below, widely considered as carrying wood tablets in his belt, is in fact carrying a ‘codex’ of papyrus or parchment; see Boudalis 2018, 36, fig. 19. Instead, there is plenty of iconographic evidence of people carrying around tablet codices through a handle, a topic which in fact still requires detailed consideration. On Machon and the phrase from his work considered here, see Machon, *Fragments*, 403–404, ed. Gow 1965, 52, and the corresponding commentary on pp. 127–128. I am grateful to Elias Tsolakopoulos for bringing Andrew Gow’s book to my attention.

52 See for example London, British Library, *Manuscripts Blog*: <<https://blogs.bl.uk/digitisedmanuscripts/2019/05/keep-taking-the-wax-tablets.html>> (accessed on 4 November 2024).

53 ‘Graphiarium. Haec tibi erunt armata suo graphiaria ferro: si puero dones, non leve munus erit’ (‘Stylus case. These stylus cases you will arm with their steel. If you give them to a boy, it will be no slight gift’; Martial, *Epigrams*, vol. 3, ed. and tr. Shackleton Bailey 1993, 236–237).

54 Meyer 2009, 593 and n. 84 correctly identifies and specifically mentions this detail when describing the ‘Sappho’ portrait. She calls this accessory a ‘stylus case’.

55 The painting was originally reproduced in Bayardi 1760, when it was still in good condition. The painting survives still today but is a much more worn state. Both are reproduced in Meyer 2009, fig. 3 and Appendix 1, 590.

56 This wall painting fragment was included in the exhibition ‘La Biblioteca Infinita: I Luoghi del Sapere nel Mondo Antico’, curated by Rossella Rea and Roberto Meneghini (Rome, 14 March to 5 October 2014), but the catalogue does not include a photo of it. A photo is published in Boudalis 2018, 31, fig. 18.

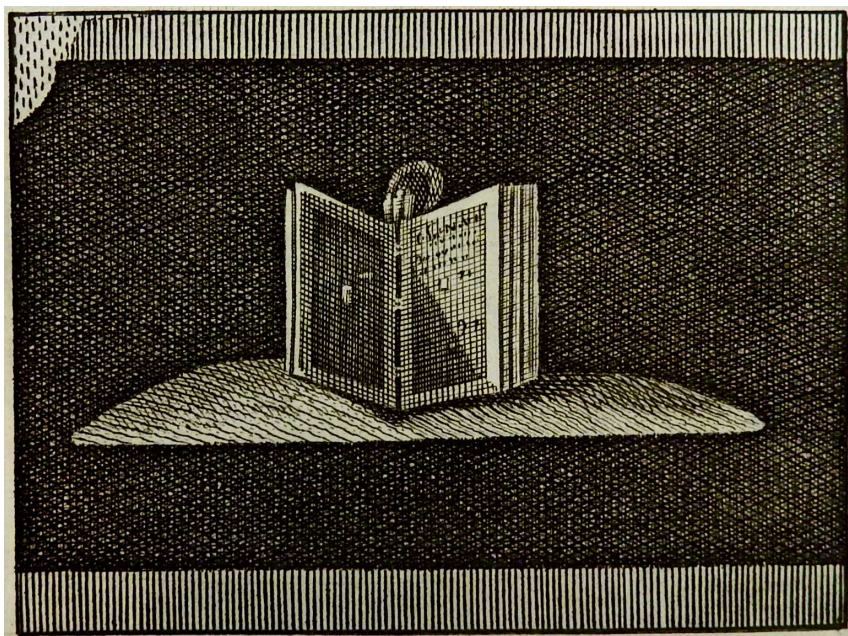


Fig. 12: Detail from a wall painting from Herculaneum (MN 466C), as drawn by Bayardi 1760, 93, showing a wax tablet codex with a stylus case in the spine and three styluses inserted.



Fig. 13: Detail from a wall painting from the theatre of Nemi showing a wax tablet codex; © Museo Nazionale Romano, Terme di Diocleziano.

By contrast to painting, funerary stelae, especially from Asia Minor dated between the first and the third century CE, offer numerous representations of this codex appendage (Figs 14–17).⁵⁷ In these scenes, wax tablet codices are usually shown next to rolls and writing implements like pens and inkwells, and they are clearly shown in a similar way as in the ‘Sappho’ portrait, with the cover of the stylus case dropping backwards. The first to identify these stylus cases as such were Christopher Cox and Archibald Cameron, in funerary monuments from Asia Minor.⁵⁸

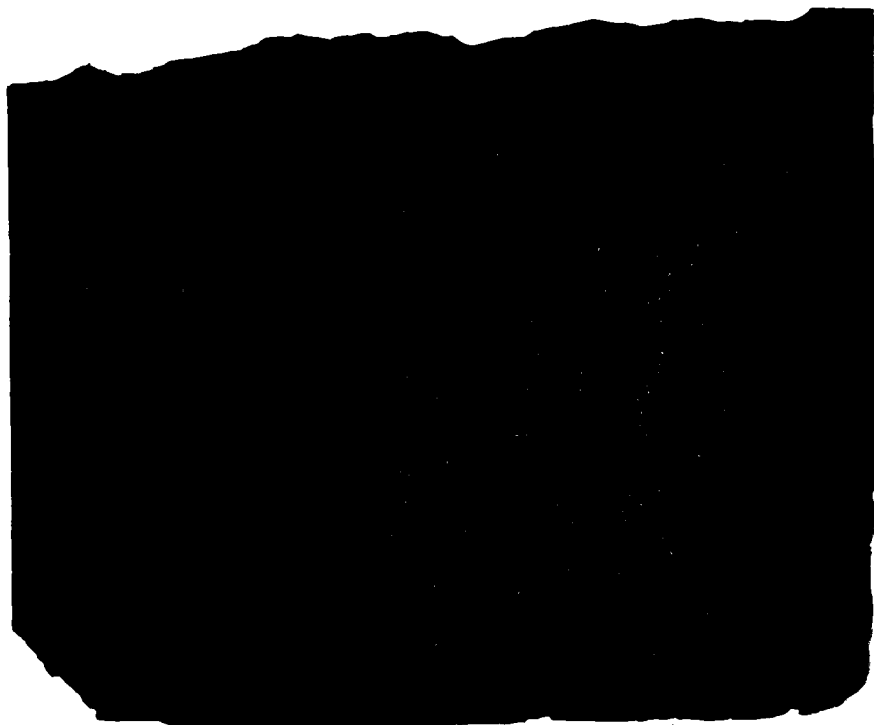


Fig. 14: Fragment from a tomb door from North Phrygia, second half of the second century to first half of the third century CE. At the top left corner, an open roll is depicted, and to the left of it, a tablet codex with the stylus case cover dropping backwards; from Waelkens 1986, 138, cat. no. 347.

⁵⁷ Cox and Cameron (1937) mention several examples; the same in Waelkens 1986 (for example, cat. nos 332, 335, 347, 405, 406, 429, 434, 443, 468 and 786; figs 29, 37, 42, 43 and 49, among the 807 stelae considered). Further examples are published in Starac 2006, cat. nos 67, 108; Corsten 1991, cat. nos 117, 170. Also Zaccaria 2007, 289, 291, figs 5 and 6.

⁵⁸ Cox and Cameron 1937. See their cat. no. 41, plate 21, dated to the late second or early third century CE, where they refer to various other examples including the ‘Sappho’ portrait from Pompeii.

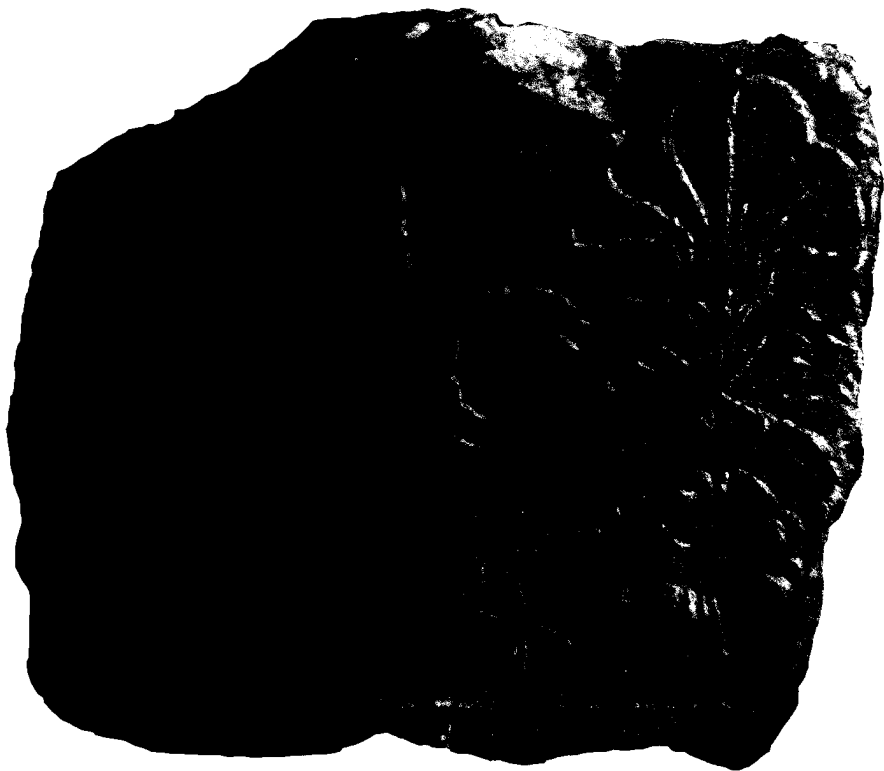


Fig. 15: Fragment from a tomb door from Central Phrygia, late second–early third century CE. To the left is a tablet codex with a double stylus case and a stylus inserted; from Waelkens 1986, 174, cat. no. 434.

Cox and Cameron identify the stylus case as a ‘stylus-sheath’ and the backwards-bending cover as a ‘projecting thong of varying length for attaching to the girdle [...] or for carrying’.⁵⁹ In most cases, Marc Waelkens completely omits naming the stylus case and only refers to its cover as ‘a strap’;⁶⁰ however, when discussing his cat. no. 332, which was previously described in detail by Cox and Cameron, paying special attention to the ‘stylus-sheath’, he does repeat their identification.⁶¹ Most other researchers accept and repeat this identification. For example, Thomas

⁵⁹ Cox and Cameron 1937, 24.

⁶⁰ Waelkens 1986, 135, plate 48, cat. no. 335.

⁶¹ Cox and Cameron 1937, 24; Waelkens 1986, 134, plate 48, cat. no. 332.

Corsten refers to it as a *‘Griffelbehälter mit Riemen’* (‘stylus container with strap’);⁶² Claudio Zaccaria calls it an *‘astuccio’* (i.e. case, box, pouch);⁶³ and Dragan Božič and Michel Feugère call it an *‘étui de cuir, ouvert, dont dépasse le sommet d’un stylet’* (‘open leather case, from which the top of a stylus protrudes’).⁶⁴ Verena Schaltenbrandt-Obrecht, the author of the most extensive book on styluses from Augusta Raurica and other sites, is the only scholar who, in addition to identifying it as a stylus case, also recognises the backwards-dropping strap as the cover of the case.⁶⁵ Tibor Grüll, however, considering mostly the same material previously published by Cox, Cameron and Waelkens, has an altogether different interpretation. He considers previous identifications as ‘obviously wrong’ and proposes that what other scholars identify as a codex with a stylus case in the spine is, in fact, a ‘codex with hinge and horn’, whereby this description is labelled as a ‘working title’.⁶⁶ Setting aside the numerous and significant iconographic evidence previously considered, Grüll supports his interpretation by drawing a visual comparison between the simplest depictions of codices with a stylus case (ignoring those images that clearly show styluses inserted in the case, such as in Figs 11, 15, and 20) and the hinge mechanism of the small metal Basilides Codex – ‘an exception itself’, as Grüll acknowledges. He further draws a visual comparison to the ‘booklet’ secured to the belt of a small bronze statuette of an artisan in the Metropolitan Museum of Art collection in New York, which has been previously identified as probably the earliest iconographic evidence of the use of a papyrus or parchment codex, rather than a wooden tablet codex.⁶⁷

62 Corsten 1991, 148–149, cat. no. 117, dated to the late second century CE. My translation.

63 Zaccaria 2007, 291–292, figs 6, 7.

64 Božič and Feugère 2004, 31. My translation.

65 Schaltenbrandt-Obrecht 2012, 28, fig. 14: ‘zungenförmige Etuideckel wurde wohl zum Verschiessen unter einer Lasche durchgesteckt’ (‘tongue-shaped case lid [that] was probably inserted under a tab to close it’; my translation).

66 Grüll 2023, 106–108.

67 Object number 1972.11.1, Boudalis 2018, 36, 37.



Fig. 16: Fragment from a tomb door from Central Phrygia, late second–early third century CE. At the top are three objects: a comb, a mirror, and a tablet codex with a stylus case and extending strap cover; from Waelkens 1986, 173, plate 62, cat. no. 434.

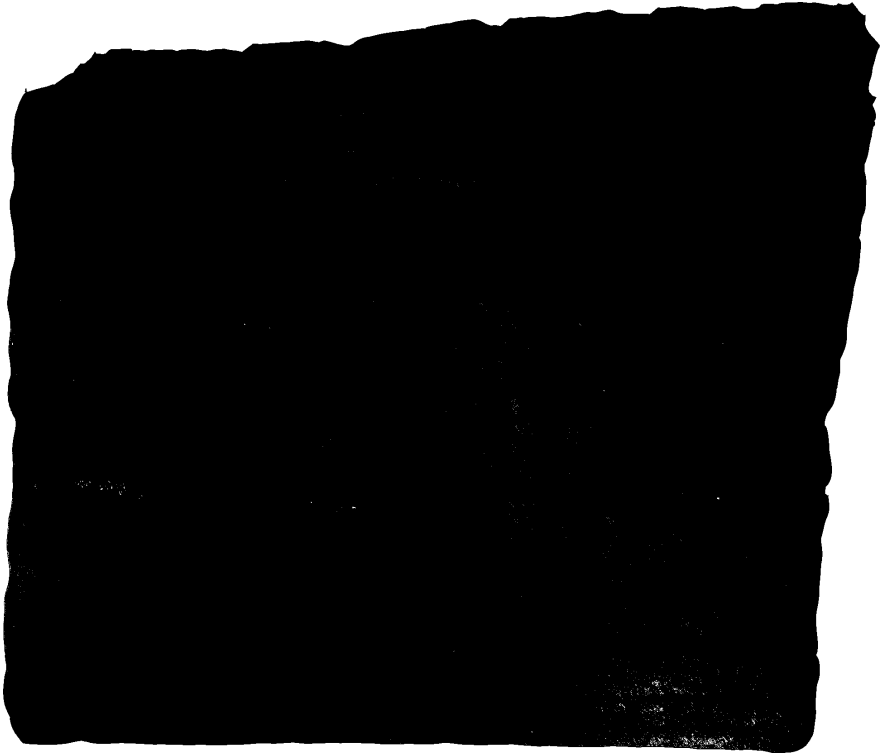


Fig. 17: Fragment from a tomb door from Central Phrygia, second half of the second century CE. From left to right are: a basket with fruits, a mirror, a comb, two *calami* (pens), an open roll, and a tablet codex with a double stylus case with extending strap cover at the spine; from Waelkens 1986, 164, plate 63, cat. no. 405.

How might such a stylus case be attached to a wax tablet codex? The frequent depiction of tablet codices without stylus cases suggests that the cases might have been designed to be detachable, possibly using the same holes employed to sew the tablets together. My own experimental reconstructions demonstrate that this method is both feasible and functional (Figs 22a–c). The stylus case could be secured to the tablet codex by lacing leather thongs through the sewing holes on either side of the stylus case. A leather thong remnant on an early-fourth-century CE wax tablet at the Chester Beatty Library, Dublin, may have served such a purpose (Fig. 23). For an optimal fit, the stylus case likely would have been made to match the dimensions of a specific wax tablet codex, including its length and spine thickness. The hypothetical model that I created functions well: it allows the tablet codex to open and close freely while enabling easy detachment of the stylus case. Assuming the stylus case was a separate accessory, complete with its own cover, that could be attached to the spine of the

tablet codex as needed, it would make sense for the cover to bend backwards once attached, as closing and opening the case would be impractical when fixed to the spine. Indeed, in almost all representations – whether in painting or sculpture (Figs 11a, 12–14, 16, 17) – the cover is shown bent backwards or occasionally extending above the head (?) edge of the codex, as seen in the example from the Benaki Museum, Athens (Fig. 19).⁶⁸



a



b

Figs 18a–b: (a) Funerary monument of the warrior Ariston, first century BCE, Istanbul Archaeological Museum, inv. no. 3980T. (b) Detail of Fig. 18a: among several personal objects, in the left lower corner is a codex with a double (?) stylus case and an extending strap cover. Photograph by the author.

⁶⁸ It is interesting to note that the caption at the Benaki Museum identifies the tablet codex as a box.



Fig. 19: Detail of a marble stele from Megara, first century BCE / first century CE; Athens, Benaki Museum (inv. no. ΓΕ 31182). Photograph by the author.



Fig. 20: Detail from the funerary stele of Quintus Vibius Modestus, Assisi, Forum Romanum, second half of first century BCE/early first century CE. Next to a roll is a tablet codex with a double stylus case at the spine and two styluses inserted. *CIL* XI 5425. Photograph courtesy Museo Foro Romano, Assisi.



Fig. 21: Detail from a funerary relief, dated to the first or second century CE, with various architectural instruments. To the right: ten papyrus rolls tied together; to the left: a pen, stylus, and ink case with the long cover dropping backwards; Kansas City, MO, Nelson Atkins Museum, inv. no. 41-63/4; from <<https://art.nelson-atkins.org/objects/15938/>> (accessed on 28 October 2024).

Similar covers dropping backwards also can be seen with pen-and-inkwell cases, usually identified as straps for attaching them to a girdle (Fig. 21). For practical reasons related to the safeguarding of the styluses and pens within these cases, it seems unlikely that they would have no cover. Therefore, it appears more plausible to identify such elements as covers for the cases rather than as straps for attaching them (how?) to a girdle.⁶⁹ Why these stylus, pen and inkwell cases are depicted with their covers open rather than closed is not entirely clear. Perhaps the intention was to explicitly show the pen or stylus inserted within, aiding in the identification of the complete object.

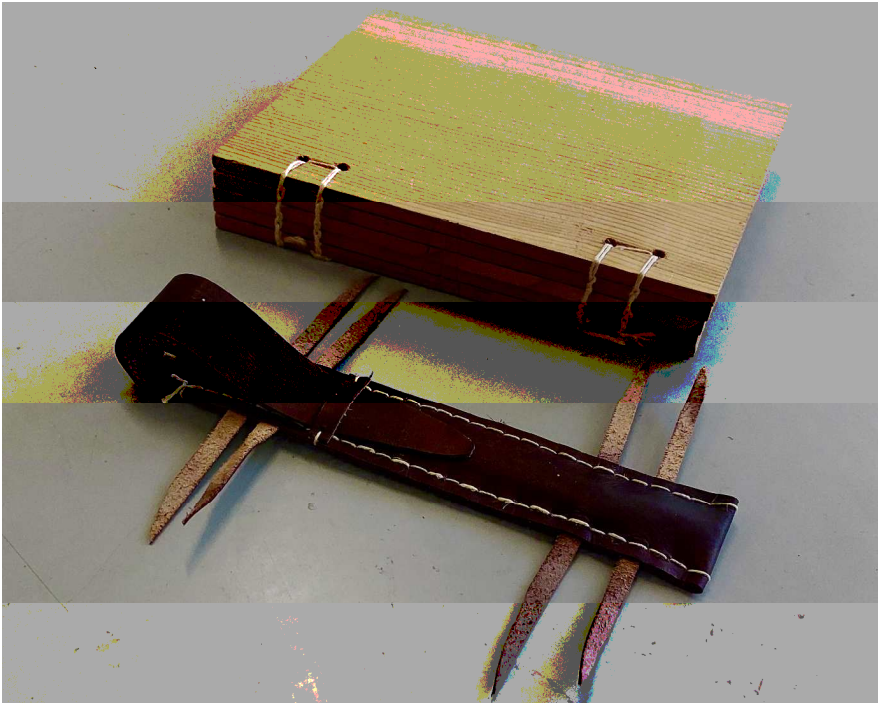
Most of these closed codices with a stylus case also display a star-shaped element on the fore edge, varying between a more square shape and one with four distinctly pointed, elongated ends (Figs 15–17, 19, 20). This feature is, in fact, a key element for identifying tablet codices in art. The same motif is indeed preserved in a few surviving tablet codices, such as a five-tablet ivory *pugillaris* from Aquileia (Fig. 24); an eight-tablet *pugillaris* now in the Roemer- und Pelizaeus-Museum, Hildesheim (inv. no. 5453);⁷⁰ and a wooden tablet in the British Museum, London.⁷¹ This accessory was apparently a closing device similar, if not identical, to the locking device in the boxes used to house rolls for storage and transportation known as *capsae*, as abundant physical and iconographic evidence shows.⁷²

⁶⁹ See Kansas City, MO, Nelson Atkins Museum, inv. no. 41-63/4, <<https://art.nelson-atkins.org/objects/15938/>> (accessed on 28 October 2024). Another second-century example, where the strap is interpreted by Waelkens as a handle, is reproduced in Waelkens 1986, 133, plate 47, cat. no. 329. On stylus and pen cases, see Willi 2021, 83–85.

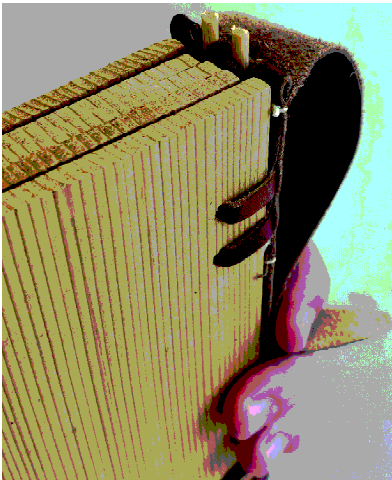
⁷⁰ See the record available at <<https://www.globalegyptianmuseum.org/record.aspx?id=11398>> (accessed on 28 October 2024).

⁷¹ This is mentioned in Cox and Cameron 1937 when discussing their cat. no. 41. A photo is also provided in plate 21. I was unable to find this tablet through a search in the British Museum online collection.

⁷² This accessory is discussed in Speidel 1996, 30 with fig. 12; Zaccaria 2007, 293; Božič and Feugère 2004, 25; and Feugère 2006.



a



b



c

Figs 22a–c: Hypothetical reconstruction of a stylus case and how to attach it to a wax tablet codex; replica of an original dated to the fourth century CE, Brooklyn, NY, Brooklyn Museum, CUR 37.1908E, 37.1909E, 37.1910E, 37.474E, 37.473E. Two bamboo sticks are inserted in the stylus case instead of metal styluses.



Fig. 23: Detail from the wax tablet Dublin, Chester Beatty Library, WMS 142.6, dated to 300–320 CE. The photo shows the preserved leather thong vestige within one of the tablet's four holes. Photograph by the author.

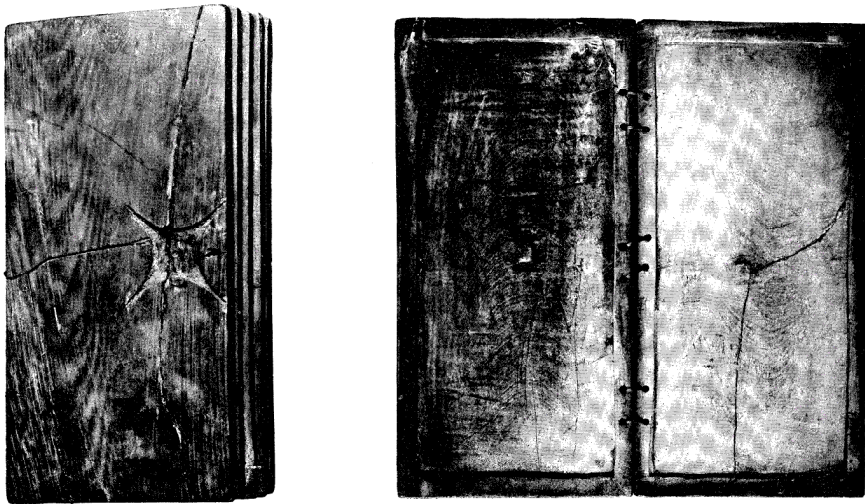


Fig. 24: A five-tablet ivory *pugillaris* from Aquileia; from Zaccaria 2007, 293, fig. 8.

From the above discussion, it should be clear that, at least from the first century BCE (the date of our earliest iconographic evidence), wax tablet codices could have a stylus case or sheath for safely carrying around metal styluses. Such a case would have been attached in a manner that allowed the tablet codex to open and close freely while enabling the case to be detached and reattached as needed. Although to my knowledge no physical evidence of such a stylus case has been found, the numerous realistic artistic representations, along with simple practical considerations, leave little room for doubt about their existence, at least in Roman times.

6 The stylus case and its possible influence on a type of binding from the early Christian centuries

The stylus case and its extending cover, so often depicted as dropping backwards, may be the key to understanding one of the most awkward and puzzling book structures of early multi-gathering codices. This is the structure exemplified by the Glazier Codex (G.67), now in the collection of The Morgan Library and Museum, New York, one of the earliest codices preserved almost intact. The codex was written on parchment in the fifth century CE and contains the Acts of the Apostles.⁷³

Essentially all the different components of the Glazier Codex are preserved, including the long fastening straps meant to be wrapped around it when not in use; the leather cover along the spine, with its extension over the head edge; and the five transversal leather thongs laced through the leather spine cover and the boards.⁷⁴ The gatherings of the codex are sewn with a linked-loops stitch (also known as a link stitch or chain stitch),⁷⁵ and the boards are connected to the book block essentially through adhesive applied to the codex's leather spine cover. This spine leather cover was previously connected to the two boards through an elabo-

⁷³ New York, NY, The Morgan Library and Museum, inv. no. G.67, <<https://www.themorgan.org/manuscript/77061>> (accessed on 28 October 2024). The small codex is named after William S. Glazier, who bought the codex in 1961. For a detailed description of the codex, see Miller 2022, with literature.

⁷⁴ It is still unclear if the codex originally had endbands at the head and tail edges of the spine.

⁷⁵ On the technical details and terminology related to this type of sewing, see Boudalis 2023.

rate method involving (a) five leather thongs, symmetrically distributed along the spine, laced through it and the boards from the outside to the inside, and (b) the two lateral extensions of the spine leather, which were pasted on the inner face of the boards, above the ends of the five leather thongs after they were laced through the boards (Figs 25, 26a–b).

This is an elaborate and rather awkward method to connect the boards to the book block, especially considering that, despite the delicate and complicated lacing of the five leather thongs through both the leather spine cover and the boards, this connection essentially relies only on the adhesive on the spine. The same method for connecting the boards to the book block is attested in other codices too; in fact, it is found in several of the earliest codices preserved in a more or less complete state.⁷⁶ The holes through which the thongs were laced through the wooden boards are usually narrow, in some cases as narrow as one millimetre wide. This fact combined with the very large number of such holes in some of these codices means that the task must have been both delicate and very demanding. This method is all the more puzzling considering that, despite all effort, the final connection between the leather spine cover and two boards with the book block relies only on adhesive and not on any other mechanical means, like thread lacing, as in later Coptic and Byzantine bindings.

⁷⁶ In the fifth-century codex Barcelona, Arxiu Històric de la Companya de Jesús a Catalunya, Palau Ribes, 181–183, there are three thongs (leaf dimensions 20 × 16.5 cm); in the fourth–fifth-century codex Princeton, NJ, Scheide Library, 144, there are four thongs arranged in two pairs (leaf dimensions 12.5 × 10.5 cm); in the fifth–sixth-century Mudhil Codex (LDAB 107731, kept in the Cairo Coptic Museum), there are four thongs (leaf dimensions 18 × 13 cm); in the seventh-century codex Dublin, Chester Beatty Library, Cpt 814, there are seven (leaf dimension 12 × 10 cm); in the fourth–fifth-century Freer Gospel (Washington DC, Freer Gallery of Art, F1906.297), there are as many as twenty-six such leather thongs distributed along the length of the spine (leaf dimensions 21 × 14 cm); and in the sixth-century codex Dublin, Chester Beatty Library, Cpt 813, there are thirty-four (leaf dimension 15 × 13 cm). On these codices as a group, see Sharp 1996; Szirmai 1999, 15–31.

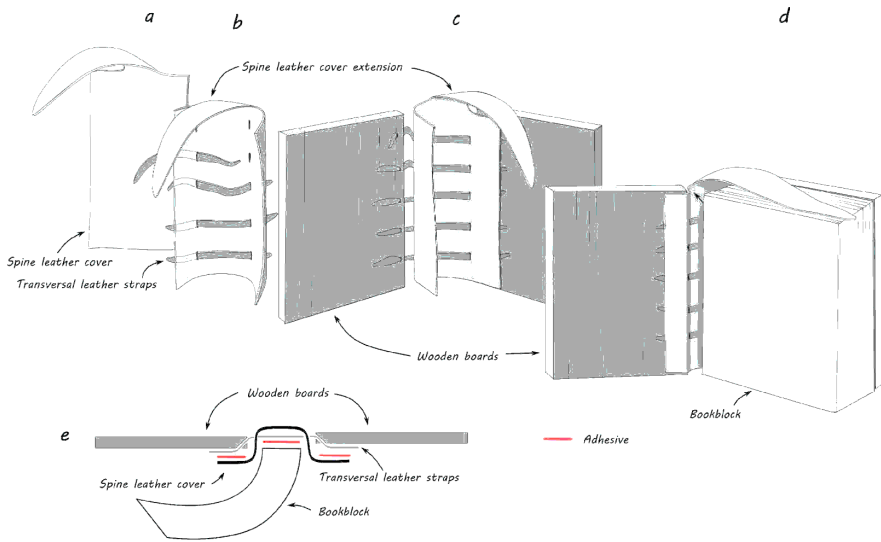
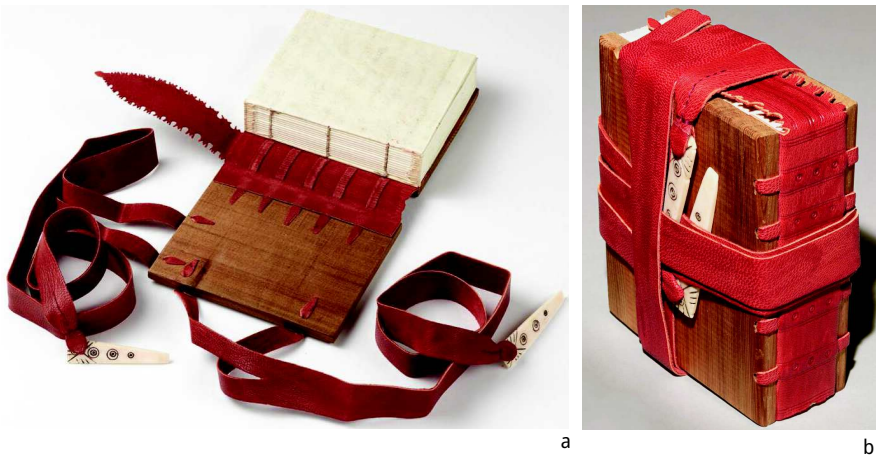


Fig. 25: Schematic drawing showing the steps for constructing the Glazier Codex. From left to right: (a) the cut of the leather spine cover to size; (b) the lacing of the five transversal leather thongs through the spine cover; (c) the lacing of the leather thongs through the two boards; (d) the pasting of the leather spine cover extensions onto the inner face of the two boards, on top of the laced leather strap ends; and (e) a cross section of the structure. Drawing by the author.



Figs 26a–b: Reconstruction of the Glazier Codex, displaying (a) the leather spine cover before it is pasted onto the spine of the book block, and (b) the long fastening straps, both loose and wrapped around the closed codex. Note the extension of the leather spine cover in both (a) and (b). Model by Ursula Mitra; photographs by Bruce White; originally published in Boudalis 2018, 72, figs 45–46.

The second puzzling feature of the Glazier Codex is the extension of the leather spine cover from the head edge. The extension is tongue-shaped and has indented edges and some blind-tooled lines running parallel to its long side (Fig. 27). It is assumed that its purpose was to protect the head edge of the book when the book was secured with the fastening straps (Fig. 26b). So far it is not possible to say whether the codex originally had another similar extension at the bottom edge, which might have been lost. Nevertheless, a similar leather spine cover was recently identified in the collection of the Deutsches Ledermuseum in Offenbach, erroneously catalogued as a belt vestige, which might help clarify this issue (Figs 28a–b).⁷⁷ The leather cover remnant preserves a single, tongue-shaped spine extension, presumably extending from the head edge. The fragment is dated to the fourth–seventh century CE, is made of red leather (now significantly darkened), and measures 20 × 6 cm. It retains several key components, including at least six out of many transversal leather thongs used to connect the spine cover to the two boards; the lateral extensions of the leather spine cover, which originally would have been pasted to the inner face of the boards; a blind-tooled decoration, consisting of blind-tooled lines, and three different figural round tools, one with a cross, another with an animal (ram?), and one with a human figure. The tongue-shaped extension has indented edges, and a cut-out Maltese cross⁷⁸ at the pointed end, while the rest of its surface is decorated with blind tooling. This includes two parallel rows of circular motifs containing the animal and the human figure; between these rows and along the edges of the tongue-shaped extension are bands of five blind-tooled lines. The decoration on the spine cover consists of five horizontal rows of five circular motifs each, and each motif contains a cross. The five rows are symmetrically spread along the spine cover and separated by bands of eight or nine blind-tooled lines. The bottom edge of the leather spine cover is cut straight, with no indication of a corresponding tongue-shaped extension originally present. The remnant of yet another codex leather spine cover extension was already published in 1909 by Oskar Wulff, who identified it as a ‘belt tongue’ (Fig. 29).⁷⁹ This is probably the reason why the Offenbach vestige was classified by the museum as a belt fragment.

⁷⁷ Offenbach, Deutsches Ledermuseum, inv. no. 5730. See Timm et al. (eds) 1996, 377. It was not possible to examine the vestige, as the museum is undergoing renovation. Nevertheless, photographs of it were kindly provided by Tulvy Turo and by the museum.

⁷⁸ A similar pattern and method are used to decorate the bookmark (?) from Cpt 814, sixth century CE.

⁷⁹ Wulff 1909, 155, plate 30, cat. no. 689.

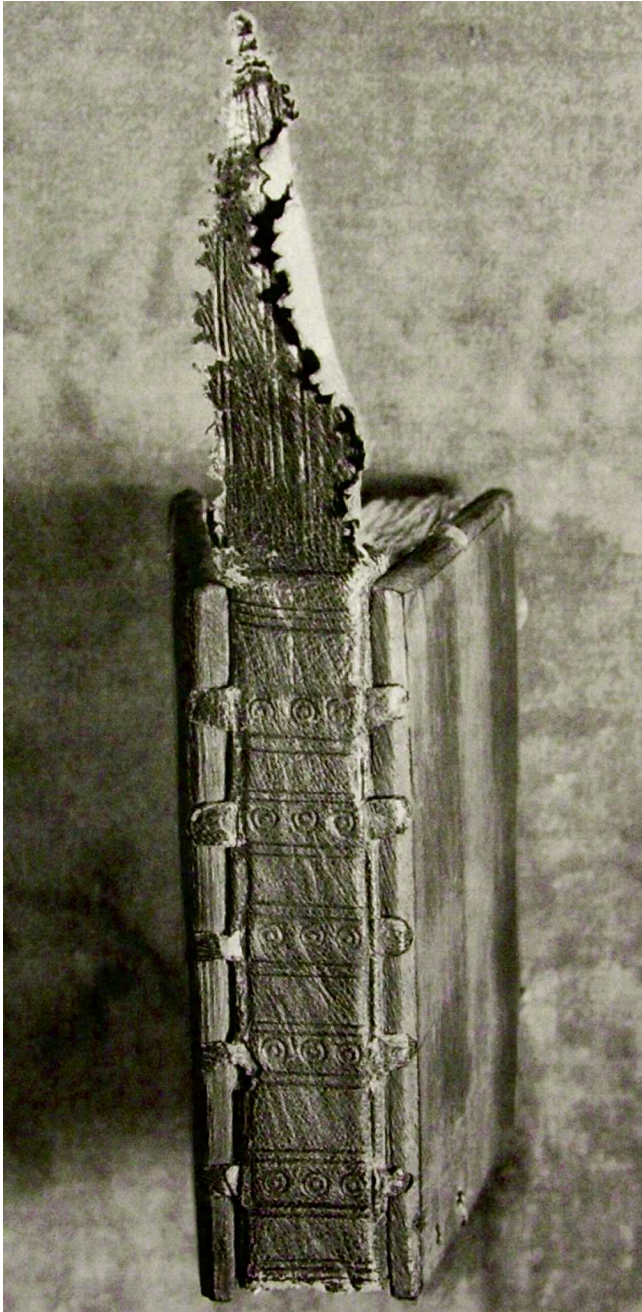


Fig. 27: The leather spine cover of the Glazier Codex, from Kebabian 1967, 27, fig. 2.



Figs 28a–b: The outer and inner face of the leather spine cover vestige inv. no. 5730, from the German Leather Museum. Photographs courtesy of Tulvi Turo; © Deutsches Ledermuseum, Offenbach.



Fig. 29: Vestige presumably from the 'tongue' extension of a codex leather spine cover; from Wulff 1909, 155, plate 30, cat. no. 689.



Fig. 30: Detail from fol. 187^r of codex Munich, Bayerische Staatsbibliothek, Clm 10291, a copy made in 1542 and 1550–1551.

The debate over whether the Glazier Codex might have had a similar extension of the leather spine cover at the bottom edge has been long running. No definitive answer has been reached so far, partly because we instinctively look for symmetry and consider its lack where one would have expected its presence, as a sign of disturbance and disorder. However, the fact that both examples discussed here – the Glazier Codex and the Offenbach fragment – feature the extension solely at the head suggests that such extensions were likely not present at the bottom edge. The Mudhil Codex in the Coptic Museum in Cairo, with its spine cover head extension long enough to cover all three edges of the book block, can be taken as a further hint that such extensions were only found at the head edge.⁸⁰ Finally it should be noted that some of the codices shown in the *Notitia Dignitatum*, an administrative document of the Roman Empire of the East and West compiled around 400 CE – which survived through a ninth-century copy, which itself was extensively copied in the sixteenth century and subsequently lost – show spine extensions only at the head edges (Fig. 30).

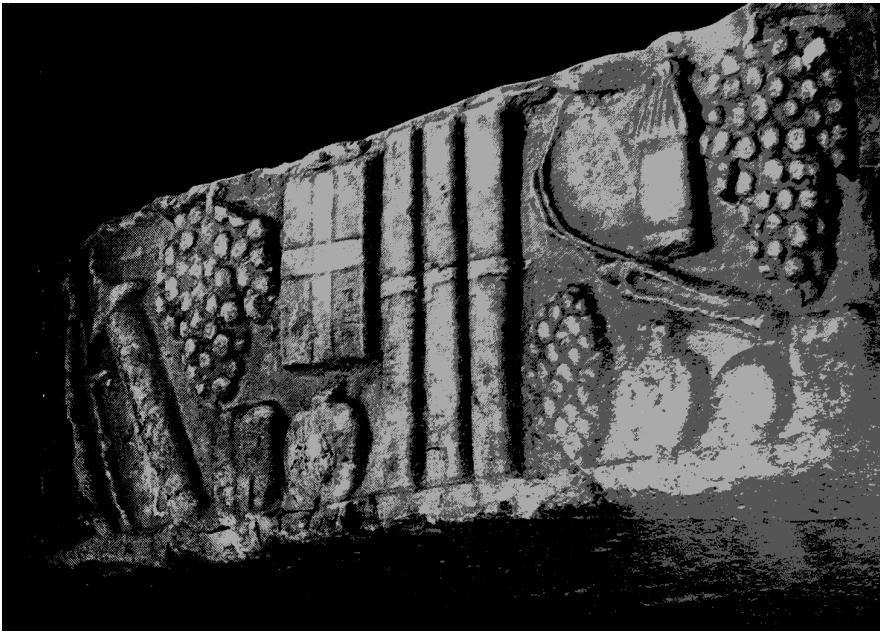


Fig. 31: Corner block of a tomb from Ilion, Greece, first century BCE. Note the three rolls, each tied individually, and to their left, a tablet codex fastened crosswise; from Pfuhl and Möbius (eds) 1979, cat. no. 2277.

⁸⁰ On this topic, see Miller 2020.



Fig. 32: Icon with the effigy of the Evangelist Mark holding a fastened gospel (?) codex, from Fayyūm, Egypt, sixth century CE; Paris, Bibliothèque nationale de France, Cabinet des Médailles, cat. no. Fr 1129a.

Could the leather spine cover and its extension in these early parchment codices represent an adaptation of the leather stylus cases attached to tablet codices, apparently a very common feature at least between the first century BCE and the third century CE? Could the awkward method used to attach the leather spine cover to the boards be an adaptation of the way the stylus cases might have been attached to tablet codices? The hypothesis is certainly worth considering. Such an adaptation would explain the awkward presence of the leather cover only along the spine of multi-gathering codices as well as its extension only at the head edge. The visual similarity to the loose cover of stylus cases is certainly striking. This hypothetical link may also shed light on the seemingly awkward method used to connect the boards and leather spine cover to the book blocks in multi-gathering codices, potentially inherited from the method used to attach the stylus case to the wooden board codices tentatively reconstructed above.

The issue of the influence of wax tablet codices on the shaping and crafting of early multi-gathering papyrus and parchment codices will certainly keep us busy in the future, as the evidence suggest that this relation might be closer than previously thought. The remains of a decorated stone tomb from the first century BCE shows what is identified as a tablet codex, fastened crosswise in a manner strikingly similar to the very characteristic fastening style of early multi-gathering papyrus and parchment codices, thus indicating yet another possible connection (compare Figs 26b and 31, 32). Although this is, as far as I know, the only example we have of such a fastening used in a tablet codex, it is nevertheless an exciting and intriguing new piece of evidence which requires further investigation.

7 Conclusions

Recreating the evolution of writing media from Antiquity to the Middle Ages inevitably has to rely on the random survival of physical evidence, frustratingly scant, incomplete, and at times puzzling. Iconographic evidence can sometimes fill at least some of the gaps, occasionally allowing us to confirm the presence of features of which we have no physical evidence or have failed to identify.

In this article, the ample iconographic evidence of an appendage attached to the spine of wax tablet codices used to carry styluses, for the protection of both stylus and user, should leave little doubt about the use and wide distribution of such stylus cases or stylus sheaths, at least in Roman times, even if so far we have no identified physical evidence for them. The fact that the great majority of such evidence is sculpted in stone makes it all the more relevant, due to the effort needed to shape these details in stone – reflecting the importance that such detail

must have had for the viewer – as opposed to painting, where representing the stylus case would have been a matter of a few brushstrokes and literally a few seconds. Why – despite its rather common use, as implied by the ample iconographic evidence we have – no such stylus case has yet been found is not easy to answer, especially considering the numerous physical remains of tablets and even a couple leather tablet cases. Some physical evidence of stylus cases may be awaiting proper identification in museum deposits. Based on iconographic evidence and basic practical parameters, an experimental ‘resurrection’ of such a stylus case was proposed here. While acknowledging its hypothetical nature, this reconstruction will hopefully help us better visualise and understand the functional aspects of such an accessory, and how it may have been represented in art.

The final part of the paper dealt with the potential influence this kind of stylus case may have had on the structure of the multi-gathering parchment codices from the fourth to seventh centuries CE. Specifically, it examined how these cases might have inspired the use of a leather cover on the spine, the presence of the extended leather spine cover at the codex’s top edge, and the unique method of attaching this cover to wooden boards, as seen in several of the earliest surviving complete multi-gathering codices. In this context, a valuable leather spine cover remnant from an early multi-gathering codex, previously ignored by bookbinding scholars due to its erroneous cataloguing as a belt fragment, is reconsidered alongside similar evidence.

Proposed identifications often rely on conjectures, with the ultimate credibility of such identifications depending on the number of conjectures involved, the evidence supporting them, and how convincingly that evidence can be interpreted. Some of the conjectures made in this paper are based on rather sound and ample evidence, while others are more speculative, based on visual similarities between things that might at first sight seem unrelated. An example of the former is the identification of the appendage connected to the spine of tablet codices, which is based on ample iconographic evidence as well as practical considerations. An example of the latter is the identification of the leather tongue-shaped extension of the leather spine cover of the Glazier Codex and similar codices as basically reproducing the cover of the stylus cases used in wax tablet codices, as well as the proposed reconstruction of the stylus case and the way it was attached to the tablet codices as shown in Fig. 20. The lack of physical evidence allows us to make conjectures – sometimes bold – which can help in visualising and better understanding specific features. It is hoped that new evidence will eventually appear that will help us further support or reassess these conjectures.

Abbreviation

CIL = *Corpus Inscriptionum Latinarum*, Berlin: Reimer / De Gruyter, 1862–.

LDAB = Leuven Database of Ancient Books, <www.trismegistos.org/ldab>.

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Thomas Wozniak

Wax Tablets as Writing Media during the Middle Ages

Abstract: Wax tablets were produced and used in large numbers during the Middle Ages. The practical benefit of writing on wax tablets – erasing them and writing on them again – was frequently used. Since other writing materials such as parchment were very expensive to produce, wax tablets were often used for drafts and notes, with the most important information then transferred to other writing materials. They were also widely used for learning to write in schools (monasteries, cities) until the widespread use of paper and later slate tablets. First developed in Antiquity, wax tablets were used in the Middle Ages in different areas such as monasteries, courts of secular rulers, and city administrations. Since the last systematic compilation, by Élisabeth Lalou, was published in 1992, it is worth providing an updated overview of this important writing medium.

1 Introduction

The use of beeswax began in prehistoric times. With the use of beehives for producing honey as food, people also became aware of wax and began to use it in a variety of ways.¹

Beeswax tablet use can be traced back to the third millennium BCE, with extant examples available from the second millennium BCE.² Wax tablets were also widely used in Antiquity³ This study focuses on the use of wax tablets in the Middle Ages and forms part of a comparative analysis of various writing supports, particularly wax tablets, slate tablets, and glass panels.⁴ Note that compared to my previous article, this article addresses some different aspects and presents numerous new findings.⁵

1 Wallace-Hare 2022.

2 Cammarosano et al. 2019; Molina and Steinkeller 2023.

3 Reinard 2019; Sourlas 2020.

4 See Wozniak 2021a; Wozniak 2022; Wozniak 2024.

5 See Wozniak 2021a.

During the Middle Ages, wax tablets were more practical, cheaper to produce, and therefore more widespread than any other writing material.⁶ ‘The number of wax tablet books produced in about two millennia can only be roughly estimated; it is likely to be in the seven-digit range’.⁷ Despite their formerly high number, wax tablets have survived much less frequently than other writing media⁸ such as papyrus, parchment, and paper.

Most of the wax tablets found have been published in separate works, which does not make comparison easy. There are some very good summaries,⁹ but these are already more than three decades old. This article merely attempts to summarise the research conducted in recent years.

The older literature on wax tablets comes from Wilhelm Wattenbach,¹⁰ Hans Foerster,¹¹ Bernhard Bischoff,¹² Peter Gerlach,¹³ and Richard H. Rouse and Mary A. Rouse,¹⁴ as well as from Eva Crane¹⁵ and the superior study from Reinhard Büll, Ernst Moser, and Hermann Kühn.¹⁶ By far the largest number of studies on wax tablets has been presented by Élisabeth Lalou,¹⁷ in particular an extensive anthology¹⁸ and an inventory of post-classical wax tablets.¹⁹ Further investigations concentrate on individual aspects, such as their function as notebooks,²⁰ or on selected individual archaeological finds. Wax tablets could be used in a wide range of situations. Since Antiquity, wax tablets had been used as storage for notes of all kinds²¹ and invoices, as a tool to help students learn how to write,²² as a learning aid for Bible texts, and as a sketchbook for drawings, but also as temporary storage for concepts and drafts of information before being transferred to ‘more permanent’ media like papyrus, parchment, or paper.

6 Stein 2006, 95.

7 Gerlach 1965, 26 (translation by the author).

8 Panagiotópoulos and Kehnel 2014.

9 Rouse and Rouse 1989; Lalou (ed.) 1992a.

10 Wattenbach 1896, 51–89.

11 Foerster 1963, 39–44; Foerster and Frenz 2004, 22–28.

12 Bischoff 2009.

13 Gerlach 1965.

14 Rouse and Rouse 1989.

15 Crane 1999.

16 Büll, Moser and Kühn 1968; Büll and Moser 1973.

17 Lalou 1990; Lalou 1994.

18 Lalou (ed.) 1992a.

19 Lalou 1992b.

20 Grassmann 1986.

21 Atze 2017, 19–20.

22 Hoogendijk 1992.

Whether wax tablets ever differed in size depending on their function, as various source terms might indicate,²³ does not yet appear to have been systematically investigated, which is partly due to the rarity of their preservation.

2 On the materiality of medieval wax tablets

Wax writing tablets (Latin *tabula cerata*, Italian *tavoletta cerata*, German *Wachstafel*, French *tablette de cire*, Spanish *libros de memoria*) consist of leaves of various materials (wood, ivory, silver, bone, slate) in which a flat hollow area about 0.2–5 mm deep was created and filled with a mixture often comprising three main components: beeswax, vegetable oils, and pigments. Letters, numbers, or drawings were scratched into this mixture, which was sometimes referred to as *maltha*, using a pointed stylus,²⁴ and it could then be erased and inscribed again. It should be noted that sometimes the wax layers were so thin that some text was carved – intentionally or not – into the underlying wood, and thus preserved.

2.1 Writing material

Generally, the writing support is based primarily on beeswax and contains 5–10 per cent plant oils or resins as well as pigments (minerals, ash, soot, etc.).²⁵ Depending on the mixing ratio, the writing material would have different properties. The users of the tablets had to constantly balance the pliability of the filling material with its stability.

Beeswax itself is a mixture of many chemical components – mainly esters, fatty acids, long-chain alcohols – produced by honey bees for building honeycombs.²⁶ The beeswaxes of the wax tablets come from European honeybees (*Apis mellifera*).²⁷ The exact properties of beeswax even differ from one bee colony to another. Overall, honeybees maintain a temperature between 30 and 35°C in the nest to prevent disturbing the development of their brood. Due to its composition, untreated wax does not melt all at once, but within a temperature range, with a

²³ Rouse and Rouse 1989.

²⁴ Büll, Moser and Kühn 1968.

²⁵ Büll, Moser and Kühn 1968; Jördens et al. 2015.

²⁶ Engel 1999.

²⁷ Fröhlich 2000.

peak melting temperature of 61°C.²⁸ To improve the adhesion of this wax to the tablets' carrier material, the recessed area was roughened with diagonal scratches.

On wax tablets, the wax can dry out over the long term and, like sealing wax, tends to degrade microbiologically and mechanically over time.²⁹ In a recent research project, these microbiological decomposition processes were investigated using samples of damaged medieval beeswax seals from the archive of the Archdiocese of Gniezno in Poland. In addition to microorganisms such as bacteria and fungi themselves, their metabolic products were also analysed. In total, between 112 and 456 chemical compounds such as fatty acids, mono-, di-, and triglycerides, hydrocarbons, and lipids were identified in the seal samples, with the metabolic products in particular being regarded as indicators of the biological ageing of beeswax.³⁰

The question of whether the scribe's hand touched the wax tablet's surface during writing has been discussed on the basis of numerous historical illustrations, which cannot be examined in the necessary depth here. Early medieval illustrations generally show the hands and forearms as not touching the writing surface; however, some examples from the late Middle Ages depict the hand placed on the wax.

2.2 Materials of the medium and writing stylus

The most common material to which the wax layer is applied is wood. Beech wood was predominantly used, mostly copper beech, as it warps only slightly. The following types of wood have also been identified:³¹ maple,³² yew, oak, ash, lime, chestnut, poplar, and pine. Some conifers such as fir or spruce, especially white spruce, are also found.³³ Of the more than fifty wax tablets found in Lübeck, one is made of oak, a second of maple, and the rest of beech.³⁴ In addition to these woods, boxwood was also used for carving wax tablets because of its high hardness and homogeneity.³⁵

²⁸ Buchwald, Breed and Greenberg 2008, 125.

²⁹ Jördens et al. 2015, 371; Bartl et al. 2019.

³⁰ Szulc et al. 2020.

³¹ Gerlach 1965, 31.

³² Ermisch 1897, 205.

³³ Lalou 1992b, 250.

³⁴ Warncke 1912, 234.

³⁵ Rouse and Rouse 1990, 13.

More exclusive wax tablets were made from ivory, silver, bone, or slate. The surviving examples made from ivory³⁶ – which, due to their higher value, had a better chance of being preserved – are numerous. One example is a writing tablet from the Early English Period (9.5 × 5 cm), now held in the British Museum in London.³⁷ Lalou's publication contain numerous medieval illustrations of wax tablets.³⁸

The sharper the stylus (*grafium*, *stilus*), the better it can carve into the wax, although in this way it also risks scratching into the wooden surface beneath. Writing styluses³⁹ were made of durable materials such as metal – especially bronze and brass – but also bone and ivory.⁴⁰ They are significantly more durable than wax tablets, which are easily combustible and prone to biological decomposition due to their material (wood, wax). A stylus is a tool that tapers into a writing tip at one end and has a broadening, a crossbar or a small scoop, at the other end. This broadened end could be used to erase signs on the wax tablet.

Various options existed for transporting styluses: (1) the wax tablets themselves had a hollow, as in the case of the wax tablet triptych (16 × 9.5 cm) in Meiningen, which dates from the twelfth century;⁴¹ (2) they were hung individually, with or without their own protective cover, on a belt;⁴² or (3) they were placed in leather cases in which the wax tablets also could be transported. Since writing styluses were pointed and therefore dangerous, it was best to protect the pointed end. In some cases, special leather sheaths were used for this purpose. Late medieval examples of such leather sheaths have been found in archaeological excavations, for example in Novgorod.⁴³ Styluses with eyelets could also be worn without leather sheaths, which meant a greater risk of injury. Both the leather sheaths and styluses in Novgorod have a hole at the top so that they could be attached together to a belt. Many 'classical' styluses with spatula-shaped and similar blades also have perforations for threading a cord through to attach them to a belt.⁴⁴

36 Büll, Moser and Kühn 1968, 792–795; David (ed.) 2007.

37 Longhurst 1926, 69.

38 Lalou 1992b, 250, 261, 262, 266, 270, 272, 278.

39 Mårtensson 1962.

40 Marquart 2013, 11.

41 Dersch 1931.

42 Lüdecke and Drenkhahn 2002, 205–206.

43 Lüdecke and Drenkhahn 2002, 208.

44 Lüdecke and Drenkhahn 2002, 206.

2.3 Wax tablet formats and ‘storage density’

The size of the preserved tablets suggests two main types of use: more ‘mobile’ wax tablets that were worn on a belt, and those used primarily in writing rooms. The largest known tablets have a wax surface of 92×31 cm (Chur)⁴⁵ and 49×25 cm (Hildesheim);⁴⁶ the smallest tablets that have survived, on the other hand, measure only 5×3 cm (York)⁴⁷ and 5.7×3 cm (Cambridge).⁴⁸ Lalou has suggested that tablets may be grouped into three size categories: ‘small’ (approx. 10×5 cm), ‘medium’ (approx. 20×10 cm), and ‘large’ (approx. 35×25 cm).⁴⁹ The sizes of the tablets seem to be related to their different uses. For example, the tablets used for extensive calculations at the French royal court or in the municipal chancelleries were very large, while tablets for daily notes and school writing exercises were rather smaller.

Wax tablets often have handles for gripping and carrying. The surviving texts show evidence of both transverse and longitudinal alignment of the tablets during writing.

Wax tablets consist of either individual tablets or else two (diptychs) or more tablets bound together in book form. These books were created by connecting several individual tablets to each other with small straps.⁵⁰ Three (triptychs) to sixteen tablets are referred to as polyptychs, with octoptychs (eight tablets) being particularly common.⁵¹ Diptychs consist of two tablets bound together with the wax surfaces facing each other, protected by the often decorated outer sides. Triptychs consist of three tablets bound together, with the middle tablet often containing wax surfaces on both sides. However, wax tablets did not necessarily have to be bound together. Several tablets, usually relatively small, could also be collected in a leather case, comparable to a modern card-game set.⁵²

Wax tablets were suitable for mobile use and could be easily erased and rewritten. Felix Fabri (1441–1502), a Dominican friar from Ulm, provides in his travel diary to Jerusalem (1480, 1483/1484) one of the most vivid descriptions of the direct use of wax tablets (*tabula cerata*):

⁴⁵ Kohlhaussen 1944–1949, 13.

⁴⁶ Büll, Moser and Kühn 1968, 809.

⁴⁷ O'Connor and Tweddle 1992.

⁴⁸ Hughes 1896–1897.

⁴⁹ Lalou 1997, 1890.

⁵⁰ Gerlach 1965, 22–26.

⁵¹ Gerlach 1965, 23.

⁵² Büll, Moser and Kühn 1968, 790.

I recorded almost the entire journey from Gaza to here. As I sat on the donkey, I noted the location and nature of the landscapes and paths on a wax tablet that I carried on my belt, and then I wrote the whole thing in a booklet and erased the wax tablet so that I could write something else on it. I often got off the donkey and described the paths, mountains and valleys, because it would not be possible to remember details if you didn't go to this trouble almost every hour.⁵³

So far, research has mainly recorded the size of the tablets. By contrast, the 'storage density' has rarely been investigated.⁵⁴ In this context, 'storage density' refers to the number of incised signs or characters in relation to the available surface area. It is determined by several factors: the size of the tablet, the wax mixture, the stylus, and the writer's skill. Two factors limit the maximum amount of text that can be applied to a surface: the size of the letters (height, width) and the available wax area. The size of the letters, in turn, depends on the writer's ability to make the letters small and still legible.

Here are two examples of storage density. First, the Bamberg wax tablets (15.5 × 12.0 cm, 2.5 cm frame), which were apparently used as a register of notes and interest in a sixteenth-century Nuremberg monastery,⁵⁵ cover a wax writing surface of 84 cm² (10.5 × 8 cm). Sixteen lines with an average of about twenty-six characters per line have been handed down. The character size is 3 × 5 mm, which means that 4.9 characters (416 characters / 84 cm²) were placed in each square centimetre. Second, in 2000, during archaeological excavations in Novgorod, wax tablets from the first third of the eleventh century were discovered that contain Psalms 75 and 76 as well as short fragments of Psalm 67.⁵⁶ The wax surface of the wooden tablets (19 × 15 × 1 cm) is 178.25 cm² (15.5 × 11.5 cm). The first tablet, with Psalm 75, consists of twenty-three lines and offers space for at least two more lines, which gives a line height of 6.2 mm. A line contains about twenty-four characters,⁵⁷ which means an average character width of 4.8 mm. The storage density per square centimetre here is only 3.4 characters (600 characters / 178.25 cm²). It is worth mentioning that, for antique wax tablets, up to twenty-three characters per square centimetre was achieved.⁵⁸

⁵³ Fabri 1996, 169–170. Translation by the author.

⁵⁴ Jördens et al. 2015, 381.

⁵⁵ View the tablets at <<http://www.nbn-resolving.de/urn:nbn:de:bvb:22-dtl-0000017849>> (accessed on 22 January 2021).

⁵⁶ Rybina 2007.

⁵⁷ The fifth line contains twenty-three characters, the eighth line twenty-one, the tenth line twenty-six, and the eighteenth line twenty-five.

⁵⁸ Wozniak 2021a, 365.

3 Mentions of wax tablets in written sources

One of the oldest known references to wax tablets in Classical Antiquity can be found in Herodotus (7.239):

Enough, Demaratos, who lived in Susa and knew that Xerxes had the move against Hellas in mind, wanted to tell the Lacedaemonians about it. As there was no other way of doing this – he had to fear discovery – he had the following idea. He took a double writing tablet and scraped off the wax coating. Then he wrote the king's plan on the wood of the tablet and covered the writing with the wax again. The blank tablet was not to arouse the suspicion of the guards along the road. When the tablet reached Lacedaimon, the Lacedaimonians did not understand what the blank tablet meant. It was Cleomenes's daughter Gorgo, Leonidas's wife, who finally guessed the meaning, as I am told. She told them to scrape off the wax and then they would find the letters on the wood. They did so, found the message and read it, then shared it with the rest of the Hellenes. This is how the news is said to have spread.⁵⁹

There is a similar passage from the Early Middle Ages. Here, too, the transmission of messages was at stake, as a wax tablet was used as a kind of 'double-bottomed' container. In the year 585, Gundowald sent two clergymen as envoys to his friends. One of them, the abbot of Cahors, hollowed out a writing tablet and hid a separate letter (parchment or papyrus) under the wax. However, when Gunthram's men, Gundowald's enemies, seized him, they found the letter and brought the abbot before the king. The cleric was severely flogged and thrown into prison.⁶⁰ The observation that sources from both Antiquity and the Early Middle Ages show a similar subject does not necessarily mean that Herodotus was also read in the Early Middle Ages. The similarity could be merely an example of the persistence of ideas and not proof of a literary reference, since the idea behind it is quite obvious.

Nevertheless, Isidore of Seville, in his *Etymologiarum*, which summarises the knowledge of the ancient world, describes wax tablets as the earliest and thus probably most important writing material, even before papyrus or parchment.⁶¹

In the following sections, monastic, sovereign, and urban examples of wax tablet use are presented. Numerous overlaps emerge, for example when monks served as teachers for rulers and used the wax tablet as a teaching aid. The subdivisions that follow concern typical settings of use and are pragmatic, not strictly categorical, in nature.

⁵⁹ Herodotus, *Historien*, ed. Haussig 1971, 525–526. Translation by the author.

⁶⁰ Gregory of Tours, *Historiarum*, 7, 30, ed. Krusch and Levison 1951, 350; Wattenbach 1896, 65.

⁶¹ Isidore of Seville, *Etymologiarum*, 6, 9, ed. Lindsay 1911, 236–237.

3.1 Wax tablets used in monasteries

Writing was part of the daily business of clergy. In his *Rule*, Benedict of Nursia prescribes that all monks entering the monastery should hand in all their writing materials and then provided with *graphium et tabulas* by the monastery or abbot.⁶² The rule that personal belongings had to be handed in when entering the monastery may go back to John Cassian (c. 360–435). He considered it sinful for a monk to claim ownership in the shared monastic life, and even phrases such as ‘my tablets, my stylus’ (*tabulas meas, grafium meum*) were to be avoided.⁶³ Nevertheless, historical sources repeatedly describe situations in which these rules were violated. For example, the first archbishop of Mainz, Lull (710–786), is said to have given Abbess Eadburg a *graphium argenteum*, among other things, in 745/746.⁶⁴

According to the tenth-century *Vita* by Odo of Cluny, the wax tablet was worn on a belt and placed on the right thigh for writing.⁶⁵ Historiographical accounts from the late tenth and early eleventh centuries show that wax tablets were used in monastic and cathedral schools to teach writing. Bishop Wolfgang of Regensburg (972–994), for example, often had his students show him their writing exercises.⁶⁶ From the students’ perspective, Otloh of Sankt Emmeram, who is known as a biographer as well as a forger, reports that he learned to write on wax tablets at the monastery of Tegernsee.⁶⁷

A passage in the *Casus sancti Galli* connects the use of wax tablets in schools with medieval graffiti, which also have not been sufficiently researched to date.⁶⁸ Ekkehard IV writes

A woman dreamt that ‘she had given birth to a hedgehog and many little boys ran up to pull out its quills and use them to scribble on the walls’. A hermit, who was consulted for the interpretation of dreams, interpreted the dream as follows: ‘Your wife will give birth to a son’, said the seer, ‘and you will consecrate him to Saint Gall. For he will be educated by

⁶² *Regula Benedicti*, Rules 33.3 and 55.19, ed. Faust 2018, 92–93, 132–133.

⁶³ Johannes Cassianus, *De coenobiorum institutis*, lib. 4, 13, ed. Migne 1846, 169.

⁶⁴ Wattenbach 1896, 221.

⁶⁵ Wattenbach 1896, 61.

⁶⁶ Otloh of Sankt Emmeram, *Vita S. Wolkangi episcopi*, ed. Waitz 1841, 534.

⁶⁷ *Ex Othloni operibus*, ed. Wilmans 1854, 392.

⁶⁸ Wozniak 2020; Wozniak 2021b.

Gallus, become a brilliant teacher himself, and arm many boys with styluses (*stylus armaturus*).⁶⁹

The stylus was used not only to write on wax tablets but also to carve graffiti into wall surfaces.⁷⁰

Another story in the *Casus sancti Galli* describes these central functions of wax tablets: writing, erasing, and rewriting:

As he remained in that seat after compline, still in daylight, and prayed, he saw the devil sitting above him in the beams of the torn-apart ceiling, writing with a stylus on a tablet (*et stilo in tabula scribere*). And when he asked what the villain was writing, he replied: 'I am writing down the Non [prayer at the ninth hour, i.e. 3 p.m.] that you, villain, have left out today'. But Notker immediately called out to him: 'Oh God, hurry to help me!' and then he saw the devil quickly erase what he had written with a nimble hand.⁷¹

As the story unfolds, the devil throws the tablet at Notker, but misses him, causing the tablet to break with a crash. This raises the question of how wax tablets were used in general, if not thrown at people.

An entry about Hermann von Reichenau illustrates the intensive use of tablets to develop sketches, concepts, and drafts, which were then transferred to durable writing materials such as parchment. Dying in 1054, he is said to have handed over his wax tablets (*tabulas meas*) to his student Berthold, for him to correct and copy what had not yet been transferred to parchment.⁷² At the beginning of the twelfth century, Hermann of Tournai mentioned that he had written a certain number of wax tablets.⁷³ The collection of letters by Wibald of Stavelot proves that, in the twelfth century, letters were written not only on parchment but also on wax tablets.⁷⁴ Wax tablets from the administrative sector often served as templates for later invoice entries.⁷⁵

In the twelfth century, Abbot Balderich complained about the limitations of his octoptych in one of his poems. He could fit only 112 hexameters on the fourteen writable pages:

69 Ekkehard IV, *Casus sancti Galli*, lib. 31, ed. Haefele and Tremp 2020, 218–219. Translation by the author.

70 Lohmann 2017, 5.

71 Ekkehard IV, *Casus sancti Galli*, lib. 42, ed. Haefele and Tremp 2020, 254–257. Translation by the author. [Editor's note: On this passage, and on the use of the verb *planare*, see the contribution by Serena Ammirati in this volume.]

72 Berthold of Reichenau, *Annales ad a. 1054*, ed. Pertz 1844, 269.

73 Nelson (ed.) 1996, 11.

74 Hartmann 2011, 102; Mersiowsky 2015, 18.

75 Mersiowsky 2015, 18.

The page is barely eight verses wide and barely one hexameter long. And yet, in the same way, there are eight tablets, which give two times two and ten pages. For the outer surfaces at the front and back are without wax. Thus eight tablets give only fourteen writing surfaces. Thus they contain twice six and a hundred poems.⁷⁶

A register of the trade between the monastery of Cîteaux and its daughter abbeys (Morimond, Pontigny, etc.) has survived from the years 1320 to 1325,⁷⁷ and wax tablets have also been preserved from the Paradies monastery in Soest.⁷⁸

3.2 Wax tablets at the court of secular rulers

During the Carolingian era, wax tablets were in widespread use. Their function as a means of quickly recording notes meant that some, like Ercambald, who headed Charlemagne's 'chancellery' from 797 to 812, always had tablets and styluses on their belts to write down the ruler's orders.⁷⁹

In the ninth century, Einhard wrote in his *Vita Karoli Magni* that Charlemagne kept wax tablets for spontaneous writing exercises:

He also tried his hand at writing and always kept tablets and sheets ready under his pillow in bed to practise his hand at writing during sleepless hours. However, since he had only started relatively late with it, he did not get very far in this field.⁸⁰

As late as the eleventh century, the writing-savvy monks at the Abbey of Saint Gall were still referring to Einhard: 'But there were former wax tablets for writing, which, according to his biographer, Emperor Charles used to place next to his bed when going to sleep'.⁸¹ The preserved tablets of Charlemagne at Saint Gall are ancient consular diptychs.⁸²

Wax tablets are also referred to in other genres, such as letters. A letter to Abbot Grimald of Weißenburg (800–872) makes this clear, in which reference is

⁷⁶ Baldricus Burgulianus, *Carmina*, no. 12, ed. Hilbert 1979, 42, translation by the author; Büll, Moser and Kühn 1968, 876; Delisle 1872, 29.

⁷⁷ Lalou 2010.

⁷⁸ Sauer 1878.

⁷⁹ Theodulf, *Verse ad Carolum regem*, v. 147, ed. Dümmler 1881, 487; Wattenbach 1896, 66.

⁸⁰ Ekkehard IV, *Casus sancti Galli*, lib. 4, ed. Haefele and Tremp 2020, 30. Translation by the author.

⁸¹ Ekkehart IV, *Casus sancti Galli*, lib. 22, ed. Haefele and Tremp 2020, 188–189. Translation by the author.

⁸² Duft and Schnyder 1984, 62–65.

made to matters that should not be expressed on wax tablets.⁸³ A letter from Bishop Claudius of Turin, who died around 827, also mentions wax tablets.⁸⁴

The fact that in 1114, in his *Vita* for Arnulf, bishop of Metz (c. 582–645) and patron saint of the Carolingians, Abbot Hariolf of Oudenbourg mentions the use of wax tablets could indicate a back projection of his own practice at the beginning of the twelfth century.⁸⁵

An important tradition is considered to be the wax tablets from the milieu of the French kings in the thirteenth and fourteenth centuries,⁸⁶ which were used by Jean Sarrazin, the treasurer of Louis IX, in 1256/1257.⁸⁷ Wax tablets survive from the time of Philip III, from the years 1282–1286 in Geneva, as do wax tablets from the time of Philip IV, from the years 1301–1308, which have been handed down in Florence.⁸⁸ The largest of these tablets is an impressive 47.5 × 20.4 × 1.5 cm and is rounded on the right-hand side.

3.3 Wax tablets as a medium of the urban economy

In the thirteenth century, so many wax tablets were produced in Paris that a guild of tablet makers was established.⁸⁹ How tablet production was organised in other European cities has not been investigated in the existing literature.⁹⁰

Regarding the fourteenth century, the Lübeck wax tablets, which were found during construction work in 1866 in the cesspit of the former Lübeck council school, should be mentioned. There are fifty-four wax tablets, which can be combined into twenty-two wax tablet books and are dated to the years 1368/1369.⁹¹ In 1979⁹² and 1982, archaeological excavations were carried out at the same location, during which forty-nine writing styluses were found.⁹³ The size of the tablets found varies greatly, with the smallest measuring 6.7 × 3.7 cm and the largest 18.3 × 9 cm.⁹⁴ In terms of the quantity of material, they represent one of the

⁸³ *Ermenrici Elwangensis Epistola ad Grimoaldum Abbatem*, 30, ed. Dümmler 1895, 568.

⁸⁴ *Claudii Taurinensis episcopi epistolae*, 2, ed. Dümmler 1895, 595.

⁸⁵ Hariolf abbat Aldenburgensi, *Ex Vita Arnulfi episcopi suessionensis*, ed. Oswald-Egger 1888, 873.

⁸⁶ Foerster 1963, 42; Lalou 1992b, 237–259.

⁸⁷ Bouquet and Delisle 1860, 430–578.

⁸⁸ De Wailly and Delisle 1865, 284–393.

⁸⁹ Lalou 1989.

⁹⁰ Büll, Moser and Kühn 1968, 788.

⁹¹ Warncke 1912; Mührenberg 2005.

⁹² Grassmann 1980.

⁹³ Lüdecke and Drenkhahn 2002.

⁹⁴ Warncke 1912, 234.

largest collections. The collections of wax tablets in Toruń⁹⁵ and Wolfenbüttel⁹⁶ are similarly significant in scope. Further north, in Lund, several wax tablets also have been preserved.⁹⁷ The oldest tablet book (33.2 × 6.8 × 3.2 cm) dates from the first half of the eleventh century, bears the inscription 'Leowine Mynetere' ('Leowine Coiner'), and is lavishly decorated with a lion's head.⁹⁸

In particular, wax tablets with concepts for the register of castles and lists of taxes reflect municipal administrative actions and testify to the physical dealings of municipal officials from house to house.⁹⁹ These include the *Censualenverzeichnis* (census register, 1341–1361)¹⁰⁰ and *Schossregister* (taxation lists) on wax tablets from Goslar (1345, 1434, 1435),¹⁰¹ the Hildesheim draft of a *Schoss* (tax) register from around 1400,¹⁰² the Nordhausen tax register from 1358,¹⁰³ and a *Zinsbuch* (rent book) from around 1425 of the Office of the Nuremberg Burgrave with various contents.¹⁰⁴ For the Ennser Bürgerspital, *Urbars* on wax tablets from the years 1447, 1500, and 1515 have been handed down.¹⁰⁵ A commercial register (*kaufmännisches Register*) from 1397 to 1419 in German has been preserved in Hanover,¹⁰⁶ and, in Arnstadt for the year 1457, an inventory of weapons.¹⁰⁷ The large wax tablet books (39.4 × 17.8 cm, 35.6 × 14 cm) from Leipzig Council date from the second half of the fourteenth century.¹⁰⁸ The wax tablets that have survived in Gdansk¹⁰⁹ contain a concept for the register of four hundred Gdansk citizens.¹¹⁰ The Wismar wax tablets from the period 1414 to 1471, which also contain lists, have been relatively well studied,¹¹¹ and a comparative study is available on the wax tablets of the Baltic Sea region as a whole.¹¹²

95 Lalou 1992b, 273–275; Górski and Szczuczko 1984.

96 Lalou 1992b, 277–278.

97 Lalou 1992b, 263–264.

98 Cinthio 1990, 49.

99 Wozniak 2013, 58–62.

100 Heinemann 1879.

101 Steinberg 1922.

102 Reyer 1998.

103 Heinemann 1874; Anonymus 2002; Paeckelmann 1961.

104 Sprung 1950; Voit, Schultheiß and Sprung 1967.

105 Wilflingseder 1964; Pangerl 1975.

106 Ulrich 1887.

107 Schmidt and Bühring 1901; Bühring 1901.

108 Corssen 1864; Freytag 1899.

109 Bertling 1884, 1; Keyser 1923, 1–5; Galster and Keyser 1959; Lalou 1992b, 257–259.

110 Keyser 1928, 57.

111 Burmeister 1838; Lisch 1840; Jasinski 1984; Techen 1919; Beck and Henning 1994, 157.

112 Szczuczko 2001; Steffenhagen 1867.

In addition to tablets with register records, other content from municipal administrative actions has also been preserved. Such examples include the Göttingen wax tablets from the years 1330–1354 with council resolutions (felling of timber in Hainholz, late dancing, complaints to the duke, beer sales, etc.) in Middle Low German.¹¹³ Similar content (court rulings, accounts) is contained in the wax tablets from 1373 to 1419 that have been preserved in Copenhagen.¹¹⁴

Some examples show that wax tablets were sometimes transported over long distances and have been handed down far from the place where they were first used. For example, wax tablets kept in Pommersfelden contain Duderstadt interest and annuity records from 1443/1444.¹¹⁵ And in Cologne, a Thuringian income register from the fifteenth century has survived.¹¹⁶

4 The end wax tablet use

As the production of paper and ink became cheaper in the late medieval and early modern eras, their sale increased as, in parallel, the use of wax tablets decreased.¹¹⁷ Over the next three centuries, however, the consumption of paper on the European continent increased to such an extent that, by the end of the eighteenth century, the German school system had to look for alternative writing materials. Slate tablets already had been used in ancient times as an ‘occasional writing material’ and the production of slate was significantly cheaper than that of wax tablets. Despite much debate, rewritable slates were therefore introduced in the classroom from around 1800, mainly for cost reasons.¹¹⁸

Among the last examples of wax tablets in use were the raftsmen’s book of signs for salt boilers, used in Schwaebisch Hall from 1796 to 1818,¹¹⁹ and two tablets used to record transactions at the fish auction in Rouen from 1849 to 1864.¹²⁰

Another late example can be found in the city of Halle, where until the eighteenth century the *enfeoffments* with salt were recorded on wax tablets.¹²¹

¹¹³ Neitzert 1991; Ulrich 1885; Büll, Moser and Kühn 1968, 879.

¹¹⁴ Bertling 1881; Buchwald 1881; Weber 1882; Büll, Moser and Kühn 1968, 880.

¹¹⁵ Lerch 1967; Schonath 1966.

¹¹⁶ Galsterer 1983–1984; Verscharen 1997; Verscharen 2012.

¹¹⁷ Hufnagel 2020.

¹¹⁸ Wozniak 2022, 444–447.

¹¹⁹ Fehleisen 1919; Wattenbach 1866, 95–96; Zahn 1867.

¹²⁰ Lalou 1992b, 280, fig. 13.

¹²¹ Hecht 2014, 201; Wattenbach 1867, 444–460; Freydank 1938.

[A]ll changes in the original land holdings should be entered on wax tablets for each individual well, of which there were three copies, kept in different places and carried in solemn processions to the town hall on the dates of the feudal investiture. While only individual pieces of these wax tablets have survived, the respective copies of the feudal deeds on paper have been preserved.¹²²

Some of these wax tablets can still be found today in the State Archives of Saxony-Anhalt and in the Halle City Archives,¹²³ and have been the object of recent restoration work.¹²⁴

5 Summary and outlook

Both writing material and writing implement influence letterforms. Palaeographic analysis for book handwriting, charters, and inscriptions is quite advanced. By contrast, the wax tablet cursives have not yet been systematically examined with regard to their palaeographic peculiarities.¹²⁵

Observations according to which the ‘material often only allowed straight or curved single lines, so that the letterforms are highly minimalised’¹²⁶ could also point to Tironian notes, as impressively described in the *Casus sancti Galli*:

Ekkehart, however, as a master of shorthand, noted down these speeches almost without gaps in the same wording on the writing tablet. And afterwards, as he himself reported to us, his Otto [II.] had great fun with it, because the text was recited to him again and he himself perceived nothing but the abbreviation signs on the tablet.¹²⁷

Since wax tablets were the teaching medium for writing in school lessons, they probably also influenced the letterforms practised there. It can be seen that most wax tablets show either the usual contemporary cursive handwriting, including

¹²² Hecht 2011, 140. Translation by the author.

¹²³ LHASA Magdeburg, Rep. Db 14, Halle A II Nr. 26–31, 185.

¹²⁴ Online entries for the tablets are available at <<https://ausstellungen.deutsche-digitale-bibliothek.de/originalerhalt/#s1>> and <<https://www.kek-spk.de/projekt/verwundbare-gravuren-der-geschichte>> (accessed on 18 December 2024).

¹²⁵ Gerlach 1965, 34–38; Rouse and Rouse 1989, 183–186; Smith 2003.

¹²⁶ Rohr 2015, 132. Translation by the author.

¹²⁷ Ekkehart IV, *Casus sancti Galli*, lib. 131, ed. Haefele and Tremp 2020, 500–501, translation by the author.

the many curves of late medieval cursive handwriting, or, in a few cases – notably on the Lübeck student tablets – even book scripts.¹²⁸

Studies of serial invoice records offer great insights into the preliminary stages of text development on wax tablets.¹²⁹ Text blocks that stand out due to the use of different inks, additions, or content-related inconsistencies, for example in registers, may allow conclusions to be drawn about the use of wax tablets for templates.¹³⁰

Medieval wax writing tablets consist of leaves of various materials (usually wood or ivory), in which areas have been recessed and filled with a mixture generally made of beeswax, vegetable oils, resins, and pigments. Writing or drawings were then carved into this layer with the tip of a stylus. By heating the wax layer and using the broad side of the stylus, the layer could be smoothed again, thus making it possible to reuse it. Wax tablets are among the oldest media used by mankind and are therefore of particular importance.¹³¹

On the other hand, the chances of wax tablets being handed down to later generations were relatively low, which is due to the fact that both the carrier material and the writing material are highly flammable and not particularly sturdy. Their use as a carrier medium for short-lived writing such as fleeting notes, invoices, concepts, and writing exercises does not promote their preservation either.

Archaeological evidence and written sources – particularly the *Casus sancti Galli*, works by Balderich of Bourgueil, and those by Felix Fabri – prove indisputably that wax tablets were in widespread and intensive use. A total of around 625 wax tablets with around 1,280 writing surfaces from medieval and later periods are known. The recorded tablets vary in size: the smallest measure 5 × 3 cm (York) or 5.7 × 3 cm (Cambridge), the largest 49 × 25 cm (Hildesheim) or 92 × 31 cm (Chur). The most common wax colours were black, dark brown, brown, green, and red. Writing instruments used were writing styluses in different versions made of bone, ivory, and especially of (non-ferrous) metals such as bronze, whose pointed end was used for scratching and whose broad or shovel-shaped end was used for erasing.

The amount of text that could be written or stored on wax tablets varied depending on the writing surface, the tip of the stylus, the typeface, and the

¹²⁸ Gerlach 1965, 40.

¹²⁹ Mersiowsky 2016, 150.

¹³⁰ Mersiowsky 2020, 175–176.

¹³¹ I would like to thank Michele Cammarosano, Caroline Macé and two anonymous reviewers for their numerous suggestions, which have improved the text.

writer's skill. On the basis of the recorded wax tablets, a storage density in the range of 3.4 (Novgorod) to 23.2 (Athens) characters per square centimetre was determined. Whether the limited number of characters per line and per tablet influenced the design of the text has hardly been investigated so far.

Wax tablets were one of the main universal storage medium in the medieval world, and were widely used as a 'mobile device' due to their handy size and light weight. The poor state of preservation is disproportionate to the importance of this source material in premodern Europe.

Abbreviations

LHASA = Landeshauptarchiv Sachsen-Anhalt.

MGH = Monumenta Germaniae Historica:

- Epp. = series: Epistulae.
- SS = series: Scriptores.
- SS rer. Germ. = series: Scriptores rerum Germanicarum in usum scholarum separatim editi.
- SS rer. Merov. = series: Scriptores rerum Merovingicarum.

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Papyrus, Parchment, Paper, and Wood

Elena L. Hertel

Reasons for Papyrus Reuse in Ancient Egypt

Abstract: This paper re-examines the scholarly approach to understanding ancient scribes' motivation for reusing papyrus manuscripts in ancient Egypt. Previous scholarship has primarily considered the price of the raw material as the determining factor. I argue here that the material cost is less relevant to the question than the scribe's intention. Using papyri from the village of Deir el-Medina in the later part of the New Kingdom (c. 1200–1050 BCE) as an example, I propose the existence of different modes of manuscript, some of which naturally included reuse as part of their mode of use. The fact that heavily reused and non-reused papyri coexist in the Deir el-Medina material could be explained by such a model.

1 Introduction to papyrus reuse in ancient Egypt

As far as can be determined from the available sources, papyrus manuscripts were reused throughout ancient Egyptian history, making the reuse of papyri a phenomenon as old as their use. While a papyrus sheet could also be repurposed for the salvage of its raw material, for example, as a component of mummy cartonnage, in Egyptological research the term 'reuse' is most often associated with the practice of putting papyrus back into use as a writing material without fundamentally altering its function as a manuscript.

This reuse could take several forms. The most common was the practice of taking an old, already inscribed piece of papyrus and continuing to write on it, adding new, unrelated text in any spaces previously left blank. This was often done on the back of a sheet or roll but, if this area was already full of text, an ancient writer would use any free space, including the margins above and below the columns of text (Fig. 1). Erasing an existing text to make room for a new one was another option in the scribe's standard repertoire. Although there is no clear textual or iconographic evidence of how exactly such erasure was carried out, it can be observed on a large number of papyri in the form of ink smudges or faint outlines of characters and words underneath a later text (Fig. 2).

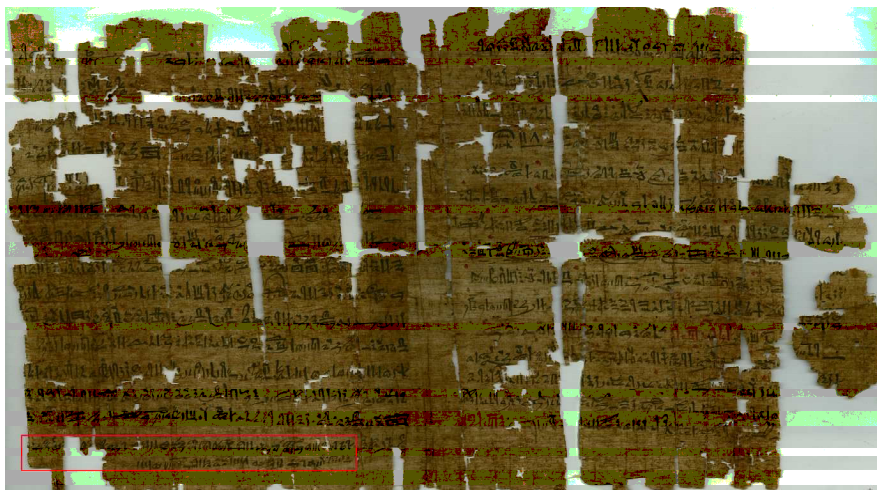


Fig. 1: An unrelated administrative note added on the margin underneath a collection of love poems (so-called *Songs from the Grove*) (my markings in red); twentieth dynasty (1190–1077 BCE); Papyrus Turin Cat. 1966 recto, <<https://papyri.museoegizio.it/o/7>>. Photograph © Scan/Museo Egizio.



Fig. 2: Traces of erased signs underneath a later text; twentieth dynasty, Ramesses IX (1129–1111 BCE); Papyrus Turin Cat. 1906 + Cat. 1939/001 + Cat. 2047 recto. Photograph by the author.

Despite the practice's widespread occurrence, only one study dedicated to papyrus reuse in Pharaonic Egypt has been published. Ricardo Caminos's short but well-informed article provides an overview of the most important information on the subject.¹ Nevertheless, he avoids delving into the specifics and explicitly refrains from proposing any particular patterns or dynamics of papyrus reuse. The caution Caminos expresses and the general lack of research on the subject are probably no coincidence. Any study that attempts to provide a more detailed account, especially when trying to answer common questions such as exactly what percentage of Egyptian papyri were reused, faces the problem of searching for evidence that has, by its very nature, largely been erased. Attempts to gain information about the deliberate erasure of text in particular are, as a consequence, necessarily tentative due to the fact that all that remains are the comparatively few cases in which the ancient writer did not fully erase the previous inscriptions and thus left detectable traces of an earlier text.² Having worked extensively with documentary papyri from the village of Deir el-Medina of the Ramesside Period (c. 1292–1077 BCE), Ben Haring estimates that around 40 per cent of the surviving papyri were reused, in this context probably meaning that they are palimpsests.³ Because of the difficulty of identifying palimpsests, the fragmentary state of many manuscripts, and the uncertainty about how much material has been lost since Pharaonic times, it is unlikely that the question of how many papyri were reused in ancient Egypt can be answered with anything other than such approximations.

The question of why the material was reused is another of the most frequently asked (or implied) questions. Egyptologists who have attempted to answer it roughly fall into two groups: those who see reuse as related to the high cost of the text carrier, and thus understand it as motivated by the urge to conserve costly resources;⁴ and those who explain it as an act of pure convenience, arguing primarily by disputing the idea that papyrus was a particularly valuable resource.⁵ The debate on the reasons for reusing papyrus thus has been heavily reliant on

1 Caminos 1986.

2 In three case studies in my dissertation (Hertel 2024, 90–154), it was possible to highlight the sometimes intense reuse and complicated evolution that some manuscripts have undergone. However, the papyri were chosen specifically for their clear signs of reuse, such as some still very prominent traces of erased text, and are therefore exceptional cases. The vast majority of the papyri with signs of erasure bear occasional ink smudges that give little or no information other than that the papyrus is a palimpsest.

3 Haring 2022, 51. The chronology followed in this paper is that by Hornung, Krauss and Warburton (eds) 2006.

4 For instance Černý 1939, XX (foreword); Černý 1952, 23; Bakir 1970, 23; and Pestman 1982, 166.

5 For instance Janssen 1975, 447–448; Janssen 1987; Donker van Heel and Haring 2003, 5, esp. n. 30.

the (as-yet-unresolved) question of the price of a sheet of papyrus and whether it was considered precious to the ancient writer. In what follows, I attempt to argue that, to understand the dynamics behind the reuse of papyrus manuscripts, it is necessary to broaden the view beyond notions of the cost of the material and instead to consider the wider range of possible uses of the material of a papyrus manuscript.

2 Reuse and the value of the text carrier

From a certain point of view, it appears logical to assume that any object that is repeatedly used without undergoing a change in function is likely reused as an alternative to acquiring and utilising a new one each time. Such a practice suggests a certain value of the object, which drives the urge to use it sparingly. While this reasoning is true in some respects, it fails to capture the nature of many reuse dynamics that are not necessarily driven by economic reasons alone but that could also have ideological or political motivations behind them.⁶ Regarding ancient societies, it may be difficult or impossible to identify such motivations for certain actions, but the lack of tangible evidence should not be used to jump to conclusions and assume that these motivations did not exist.

Most of the scholarly debate concerning the price of papyrus, its relationship to papyrus reuse, and the writing practices of ancient Egypt in general is found in research on a particular place in Egypt, a village called Deir el-Medina. This village is exceptional in many ways and deserves a brief introduction. It is located on the western bank of the Nile, near the ancient city of Thebes (now Luxor), which was built on the eastern side of the river. The western bank was occupied by large funerary temples and necropolis, most notably the Valley of the Kings, where the rulers and royal family members of the New Kingdom dynasties were buried in elaborately decorated rock-cut tombs. Deir el-Medina was home to a community of highly specialised builders, artists, and craftspeople involved in the design and

⁶ See e.g. Bolle, Theis and Wilhelmi 2015, esp. 724–726. On this notion in modern recycling dynamics, see Windmüller 2014. Modern recycling practices, such as those for glass bottles, provide illuminating examples. While it is true that recycling glass bottles saves resources, both in terms of material and in the production process, the average user is unlikely to see a bottle as being particularly valuable and, more importantly, is unlikely to consider this as the main reason for recycling. Ideological motivations, such as the desire to reduce waste, are more likely in this scenario. The statement that recycling reduces costs is true in this case, but it does not explain the rationale behind the practice.

construction of the tombs, who did not live in Thebes but closer to their workplace of the valley. Founded by King Amenhotep I (r. 1514–1494 BCE), this small but vibrant village of artisans operated for about four hundred years before being abandoned, probably during the late twentieth or early twenty-first dynasty (c. 1100–1000 BCE).⁷ The existence of the village today is a stroke of luck for archaeologists and philologists alike. Because of its location in the dry desert, in an area that has not been built over or damaged by Nile flooding, it preserves a multitude of sources of all kinds, including hundreds of papyrus manuscripts. This wealth of material and the closed context have led Egyptologists to use the village as a research site for a wide range of studies, from everyday village life to the culture of writing in ancient Egypt.⁸ However, it is important to recognise that the village is exceptional because of the high status of its inhabitants – probably some of the best craftspeople in the country, employed directly by the rulers – and their specialised and prestigious occupation. This status has several implications for the use and reuse of papyrus. For example, it can be assumed that the literacy rate in this place was higher than in the average village, since many inhabitants were highly skilled artists responsible for designing and executing the images and inscriptions in the royal tombs.⁹ Similarly, because the workforce was directly employed by the king, and as such handling prestige goods such as masonry tools and royal tomb inventories, it is likely the administrative apparatus was more thorough and complex than in an ordinary Egyptian village. As a result, the overall level of text production, and therefore manuscript use, in Deir el-Medina must be considered comparatively high.

In the early to mid twentieth century, the pioneers of the study of Deir el-Medina and its papyri promoted the idea that papyrus was a prestigious commodity, a writing material reserved for important texts, with drafts and ‘lesser’ texts written on limestone ostraca, which were readily available around the village and

7 For a concise overview of the village’s history and archaeology, see Yurco 1999. For the workmen and documentary sources, see Demarée 2016. For the current state of research on Deir el-Medina, see Dorn, Gillen and Polis 2018. A systematic bibliography can be found on the website of the Deir el-Medina Database: <<https://dmd.wepwawet.nl>> (accessed on 8 November 2024). For the abandonment of Deir el-Medina, see below, n. 30.

8 For instance McDowell 1990 (jurisdiction); Janssen 1975 (prices of commodities); Mandeville 2014 (wages); and Donker van Heel and Haring 2003 (writing culture).

9 For (possible) literacy rates in Egypt, see Baines and Eyre 1983, and esp. 86–91 for Deir el-Medina, where the authors estimate 20 per cent of the workmen could read and write. Janssen 1992, esp. 81–82, however, argues that in Deir el-Medina most of the male population, and even some women, were semi- or fully literate. For recent perspectives on personal and collective literacy in Egypt, see Zinn 2018.

of which thousands have been found in the area.¹⁰ On the basis of administrative texts from Deir el-Medina documenting business transactions and occasionally mentioning the comparative value of some papyrus manuscripts, Jacobus Janssen calculated a probable price for papyrus and, by comparing it with workers' wages, concluded that a papyrus would not have been cheap but certainly affordable for a person in Deir el-Medina.¹¹ This initiated a debate on the monetary value of papyrus, which has yet to reach a definitive conclusion. Many scholars assume that a better grasp of the affordability of a roll of papyrus is the key to a better understanding of papyrus reuse practices.

However, this line of argument hinders rather than helps the understanding of the dynamics of papyrus reuse in ancient Egyptian communities such as Deir el-Medina. Janssen has already argued that the market value of a commodity would have been irrelevant to its reuse, as Egypt's economic system at the time was more akin to a redistributive economy than a market economy in which demand determines cost.¹² Furthermore, the affordability of papyrus for individual citizens does not necessarily correlate with its reuse, as the way in which papyrus was obtained in the village is uncertain. In other words, it is not even possible to say whether users had to buy or trade a piece of papyrus, or whether they acquired it in some other way, for example, by receiving it for free in certain circumstances. A large part of the papyri that have survived from the village were used in the context of work administration and bear texts such as reports on deliveries of food and other goods, work progress reports, and notes on attendance and absences from work, but also events of importance to the village community, such as visits by high officials and court decisions on disputes between villagers.

¹⁰ For instance Černý 1952, 23; Bakir 1970, 23. The idea that ostraca were considered a less desirable writing surface is often supported by the literary text *The Teaching of Ankhsheshonqy*, in which the protagonist, who writes his teachings while imprisoned, is denied a roll of papyrus and given ostraca instead (Eyre 2013, 28). Whether this idea, expressed in a text from the Ptolemaic Period (305–330 BCE), was also present in earlier times, e.g. in Deir el-Medina at the end of the New Kingdom, cannot be said with certainty. Recent research (e.g. Bandy forthcoming) shows that ostraca were sometimes used and preserved carefully as serious administrative manuscripts, suggesting that the binary view of expensive papyrus versus cheap ostraca likely does not represent the lived reality in all cases.

¹¹ Janssen 1975, 447–448. His assessment was challenged by Caminos (1986, 52) but Janssen defended his position (Janssen 1987). The issue of assessing the price of papyrus is further discussed in Eyre 2013, 26–27 and Hertel 2024, 39–40. The most critical aspect is that there are only very few references to papyrus that might indicate its value, and the exact meaning of the terminology used for papyrus manuscripts is not clear. Whether the terms refer to a sheet of papyrus or a whole roll of several metres would obviously affect the calculations enormously.

¹² Janssen 1987, 34–35.

All these texts were written by administrators in their official capacity. Although a scribe's salary was higher than that of an ordinary worker, if they were required to purchase papyrus out of their wages, a significant portion of their income would have had to be spent on it. Considering that the same kinds of text could also have been – and often were – written on limestone ostraca, which were easily obtainable and did not cost anything, it seems strange that professional scribes would choose to use a papyrus manuscript if it meant sacrificing a substantial part of their salary necessary for providing for themselves and their family.¹³

A more plausible alternative is that the state provided administrators with papyrus as part of their work toolkit, in the same way that craftspeople's tools, such as metal chisels, were owned by the state and given out (and recollected, if necessary) by supervisors.¹⁴ Such an arrangement would also explain why papyrus manuscripts are so prevalent in the archaeological record, but in comparison transactions involving papyrus appear only rarely in the texts. In a context such as Deir el-Medina, where writing on papyrus happened primarily for administrative purposes, it is likely that manuscripts were simply not regularly traded or sold but usually stayed with their owners (or perhaps rather possessors): the people who received them as tools to facilitate work organisation on behalf of the state. If this was indeed the case, then the price of a papyrus roll was of consequence only in instances where an individual sought to procure a manuscript for private use. This certainly happened, but perhaps not as often as one might expect, since most ordinary people probably had no need to acquire a manuscript privately more than a few times in their lives. The clearest examples of papyri purchased for private use are funerary papyri, such as the *Book of the Dead*, which was placed in the owner's tomb to facilitate their transition to the afterlife; some written documentation records the price of such a roll.¹⁵ Literate individuals

¹³ It should also be noted that several texts from Deir el-Medina report strikes among the workers, provoked by deficiencies in their payments (see the list of sources provided by Müller 2004, 165–166 and Fischer-Elfert 2012 for the as-yet-earliest attestations of workers' strikes during the reign of Merenptah, r. 1213–1203 BCE). While a higher-ranking administrator such as a scribe is more likely to have been paid at this critical time than, for example, a lower-ranking stonemason going on strike, the situation in the village is unlikely to have been one of abundance, where administrators would have spent more resources than necessary.

¹⁴ Černý 1973, 159–160.

¹⁵ Janssen 1975, 245–246. Note that the price of a large, expertly written, and decorated papyrus such as a *Book of the Dead*, which likely took scribes a long time to create, was, unsurprisingly, higher than that of a blank roll of papyrus. Compare the price of 60 to 100 deben (measuring unit worth roughly 91 g of silver) for a *Book of the Dead* (Janssen 1975, 245–246) to 2 deben for an uninscribed manuscript (Janssen 1975, 447–448).

seem to have occasionally obtained manuscripts for private business¹⁶ or for writing for pleasure,¹⁷ and some sources suggest that professional scribes sometimes wrote texts at the specific request of another (presumably illiterate) member of society.¹⁸ It is unclear whether smaller pieces of papyrus, such as those used for letters, had to be purchased or simply circulated within the community due to the administrators' access to large quantities of the material and willingness to spare a piece if necessary. If the monetary value of papyrus was not a significant factor for the most common users, namely the administrators, then the most probable scenario in which the material was used sparingly would have been times when the supply was limited and the amount of text to be written exceeded the amount of available text carrier.

Little is known about where the papyrus used in Deir el-Medina came from and how the supply chain that delivered the rolls to the village was organised. However, given that papyrus could not have been grown and produced in the desert village and must have been brought in from outside, it is possible that deliveries were irregular and temporary shortages occasionally occurred. In fact, the administrative texts of Deir el-Medina regularly mention deficiencies in the supply of all kinds of goods, showing that the actual deliveries often did not correspond to the expected amounts. Although the exchange of papyrus is rarely mentioned in the texts, a manuscript records a deficit of thirty-two papyrus rolls in a list of deliveries to the village dated to regnal year seven of Ramesses IX.¹⁹ Furthermore, three large and fully inscribed papyrus manuscripts were partially erased and briefly reused for administrative notes for the time span of a few

¹⁶ A papyrus recently rediscovered in the collection of the Kunsthistorisches Museum in Vienna, for example, could be identified as a notebook for the private business affairs of the scribe Djehutimes (Hözl, Neumann and Demarée 2018).

¹⁷ Writing for pleasure is generally associated with composing and copying literary texts and the keeping of personal libraries; on this, see Blumenthal 2011. One of the most famous examples of a private collection of papyri probably written and read for pleasure are the manuscripts of Qenherkhepshef (Pestman 1982; an updated overview of the papyri can be found in Hagen 2019, 281–286).

¹⁸ For example, the text on Ostrakon Gardiner 104 (Allam 1967; and Černý and Gardiner 1957, 14 and pl. XLVII, XLVII A) was written to document the result of a dispute over the ownership of a donkey. After one party swears to acknowledge the other party's rights to the animal, the text states that it was 'made for him' (*ir n=f*), indicating that the rightful owner of the donkey requested the oath be recorded in writing. A papyrus of similar legal content, Papyrus Ashmolean Museum 1945.95 (= Papyrus Gardiner 3) related to the documents of the well-known will of the lady Naunakhte, mentions that two people were paid 'for the writings which they have made concerning the deposition of their father' (Černý 1945, 40).

¹⁹ Kitchen 1983, 613 (hieroglyphic transcription); Kitchen 2012, 444 (translation).

months between the end of regnal year seven and the beginning of regnal year eight of Ramesses IX (c. 1122–1121 BCE).²⁰ This reuse could be evidence that the village experienced a temporary supply shortage, leading administrators to recover some of the manuscripts inscribed several years earlier and reuse parts of them until new papyrus was available. The hypothesis that temporary supply shortages are the cause of increased reuse has already been put forward by some scholars, including Edward F. Wente, who suggests regular fluctuations were linked to the harvest season.²¹ Janssen highlights that in an economic system that is not market-driven, the scarcity of a resource would not necessarily result in an increase in production, and such a situation could easily lead to occasional shortages.²² It is unlikely that the availability and demand for papyrus in Deir el-Medina at any given time can be reconstructed precisely, nor can it be determined whether high demand systematically correlated with periods of more intensive reuse. Nevertheless, it seems reasonable that occasional scarcity of papyrus rolls in Deir el-Medina was a recurring issue, and that such shortages are the most plausible reason for papyrus reuse in an official administrative context.

To sum up, in determining whether an ancient writer would choose to reuse a papyrus manuscript, the circumstances surrounding the acquisition of the papyrus are likely to be more significant than the cost of the material. This conclusion is particularly relevant in a context where the majority of text production was undertaken by professional writers acting in the role of government administrators rather than by individuals using their writing in an entrepreneurial capacity or purely for entertainment.

3 The importance of intentionality in reuse

A closer look at the papyri from Deir el-Medina dating to the later part of the village's occupation, in the time of the twentieth dynasty (1190–1077 BCE), to which the majority of the preserved manuscripts can be attributed, raises further ques-

²⁰ Hertel 2024, 155–156.

²¹ Wente 1990, 4. Note, however, that even though papyrus harvest yielded the most in the summer months, it likely continued throughout the entire year (Leach and Tait 2000, 234).

²² Janssen 1987, 35.

tions concerning the writers' decisions in reusing papyri.²³ A significant proportion of these papyri are now part of the collection of the Museo Egizio in Turin.²⁴ The Turin papyri constitute a vast corpus of texts, encompassing a multitude of genres. The majority of texts are administrative in nature, although literary, religious, magical, and other texts also exist, as do drawings, architectural plans, and maps. It is not uncommon for texts of different genres to coexist on the same manuscript, which suggests that the papyri were either physically moved or at least recontextualised in their function.²⁵ However, a significant number of the papyri only provide evidence of one phase of use. The corpus includes manuscripts that are both densely inscribed and frequently reused, (e.g. Papyrus Turin Cat. 1881 + Cat. 2080 + Cat. 2092/229;²⁶ Fig. 3) as well as those with a homogenous script that suggests a single writing session, composed with a more generous layout that leaves large blank spaces around the columns and on the back of the manuscript (e.g. Papyrus Turin Cat. 1888 + Cat. 2085/190;²⁷ Fig. 4).

This dichotomy in material practice is not mirrored in the text genre or content. In other words, texts of the same content or genre can appear on both reused and non-reused manuscripts.

23 While the date of non-administrative texts is often difficult to ascertain, administrative texts more precisely datable increase in numbers during the twentieth dynasty, especially towards its end (Haring 2018, 45).

24 A part of the collection is available online at <<https://collezionepapiri.museoegizio.it/en-GB/>> (accessed on 10 June 2024); full access is possible after registration at <<https://papyri.museoegizio.it/>> (accessed on 10 June 2024). Deir el-Medina papyri from this time are also found in many other collections, such as the British Museum in London and Institut français d'archéologie orientale in Cairo. Papyri and ostraca from Deir el-Medina are best searched via the Deir el-Medina Database, at <<https://dmd.wepwawet.nl/default.asp>> (accessed on 25 June 2024), which provides metadata on the texts and references to publications.

25 Polis et al. 2020.

26 <<https://papyri.museoegizio.it/o/5>> (accessed on 10 July 2024) with references to related publications.

27 <<https://papyri.museoegizio.it/o/22>> (accessed on 10 July 2024) with references to related publications.

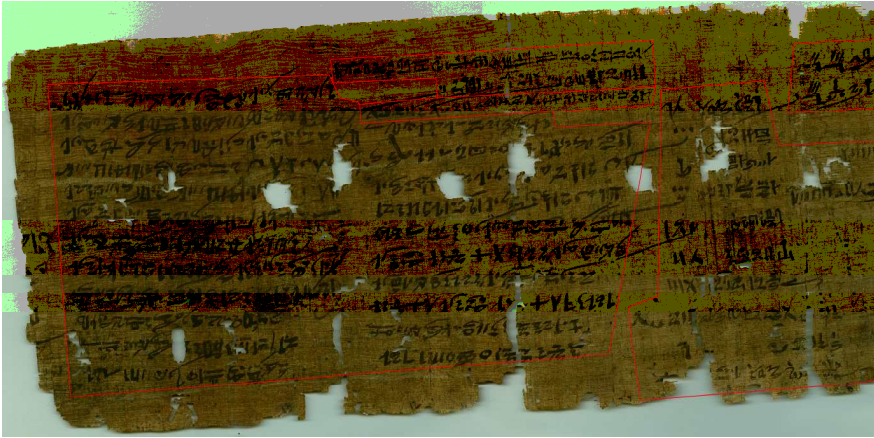


Fig. 3: A densely inscribed papyrus manuscript with some texts written upside down (detail, left end; my markings in red separate the individual texts); twentieth dynasty, Ramesses IX (1129–1111 BCE); Papyrus Turin Cat. 1881 + Cat. 2080 + Cat. 2092/229 recto, <<https://papyri.museoegizio.it/o/5>>. Photograph © Scan/Museo Egizio.

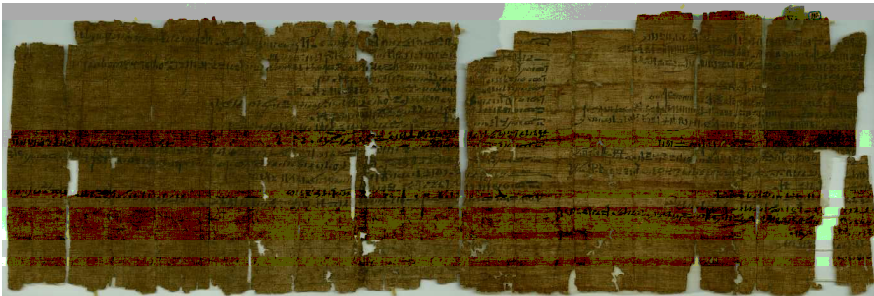


Fig. 4: A papyrus with a well-structured layout, homogenous script, and blank spaces around the text columns; twentieth dynasty, Ramesses XI (1106–1077 BCE); Papyrus Turin Cat. 1888 + Cat. 2085/190 recto, <<https://papyri.museoegizio.it/o/22>>. Photograph © Scan/Museo Egizio.

The papyri under investigation here can be attributed to the Deir el-Medina community during the twentieth dynasty based on the texts' content, which concerns matters related to the construction of royal tombs and the activities of the village. Identifying factors include references to specific individuals, the mention of dates, and a distinctive palaeography. A large part of the papyri in question were acquired from the private collection of nineteenth-century antiquities collector and Italian diplomat Bernardino Drovetti; as a consequence, it is not possible to ascer-

tain the precise archaeological context with any degree of certainty.²⁸ This lack of context is a significant limitation to understanding the physical use of the papyri and consequently affects the interpretation of the choice of whether they would have been reused or not.²⁹ Nevertheless, it is generally assumed that the papyri relating to Deir el-Medina were found in or around the village.³⁰ In the context of their original use, they likely were kept and inscribed by the administrators in a place within the village.³¹ This context may have been a storehouse or an administrative centre, or possibly the houses of the head scribes. The fact that some papyri bear both administrative and non-administrative texts demonstrates that the boundaries between use contexts were blurred. Apparently, writers could reinterpret the function of their papyri from a tool for work documentation to a manuscript for pleasure and literary writing, or vice versa. Since some heavily reused papyri coexist with those displaying large unused spaces, it can only be concluded that the scribes deliberately chose to reuse some papyri, sometimes repeatedly, while leaving others as they were.

What could have been the reason for the decision to reuse some manuscripts and not others? As one of the few scholars to directly address this question, Pieter W. Pestman reconstructed a reuse pattern for some papyri that were part of a private archive belonging to a chief administrator at Deir el-Medina, a scribe called Qenherkhepshef, and his descendants.³² He proposes that the papyri were first used to write literary texts and that the blank spaces were inscribed with matters of private business administration at a later point. This reuse he considers a sign of disrespect for the manuscripts in their original form and thus indi-

²⁸ Hagen 2018, 150–151.

²⁹ The so-called library of Qenherkhepshef is one of the few caches of papyrus manuscripts found *in situ* (Černý 1978, v–viii; more recently on the library, see Hagen 2019, 277–292). That papyri were kept in domestic spaces but also stored in tombs, a dry and protected place, is evidenced by a letter mentioning that some papyri were kept in the house of a scribe called Horsheri, where they had been rained upon and from where they were subsequently moved to a tomb for safekeeping (Wente 1967, 38).

³⁰ Earlier scholarship followed Dominique Valbelle (1985, 123–125), who suggested that the village was abandoned in the late twentieth dynasty and that its inhabitants (and likely their manuscripts) moved to the temple precinct of Medinet Habu. A recent re-evaluation by Haring 2022 points out that there was still activity in the village at the end of the twentieth dynasty. He proposes that the people moved away only gradually and highlights that the evidence for a complete move to Medinet Habu is far from convincing.

³¹ Whether or not the majority of the Deir el-Medina papyri were kept in a central archive is a still heavily debated topic; see the recent summary by Landrino 2022, 367–370. For an overview of the archives in Egypt in the time of 2500–1000 BCE, see Hagen 2018.

³² Pestman 1982.

cates a change in their perceived value. Later, parts of the papyri were cut off, and Pestman suggests that the detached pieces were used to write letters. Although this reconstruction may be accurate for the manuscripts in this particular archive, it is not possible to confirm that such a pattern of reuse based on text genre (i.e. a papyrus first had a literary use, then administrative, then epistolary) can be applied as a general rule for papyrus reuse in Egypt, or even only in Deir el-Medina.³³

An observation Wilhelm Spiegelberg makes in his edition of a number of account papyri from the time of Seti I (r. 1290–1279 BCE) provides promising ground for an alternative approach, however.³⁴ He notes that the manuscripts, although all containing accounts and calculations from the same period and context, could be divided into two groups on the basis of their handwriting: one apparently written in a more careful and ‘calligraphic’ hand, the other giving the impression of more casual and quickly written notes.³⁵ The papyri of the first group are exclusively inscribed on the front of the roll, have a clear and orderly appearance in terms of text arrangement and use of space, and show no traces of earlier erasures on the papyrus. Those in the second group have texts written on both sides, arranged in a seemingly random fashion, and many of the papyri are palimpsests with traces of earlier erasures still clearly visible. Spiegelberg concludes that the first group consists of finished accounts, ready to be archived or handed over to a responsible authority, while the second represents preliminary notes.³⁶ Continuing this line of thought, Spiegelberg’s hypothesis suggests that the intended use, rather than price or necessity, was the determining factor in whether a papyrus was reused or not. A manuscript intended for a careful summary, to be passed on to another individual or placed in an archive, would be written on a new sheet of papyrus with the texts neatly structured and no further text added to the sides, probably due to the anticipated removal from circulation (i.e. into an archive). In contrast, manuscripts that were to be kept by the writer and used and reused for daily note-taking and writings of a more ephemeral nature would naturally result in a heterogeneous look and be subject to additions, erasures, and modifications.

³³ Hertel 2024, 43–44, as well as the case studies on 90–154. That papyrus reuse in general did not follow a specific pattern was already argued by Caminos 1986, 46.

³⁴ Spiegelberg 1896.

³⁵ Spiegelberg 1896, 5.

³⁶ Spiegelberg 1896, 6.

This approach provides a solution to the dilemma of explaining the coexistence of heavily reused papyri next to those with only one phase of use in the Deir el-Medina material. While there is often no discernible difference in content between a text on a reused papyrus and a text on a non-reused one, the production process and thus the context of the manuscript's inscription may have differed significantly. More casual treatment is particularly evident in the case of administrative documents that record everyday activities, such as the delivery of goods or work progress on a tomb, or when an event of importance to the village administration took place. From a material perspective, some of these manuscripts exhibit clear indications of having been composed over an extended period, likely on a daily basis, as the events they document occurred. In such instances, the papyri were employed as a diary, with new entries continually added, updated, and modified as necessary. Visually, this constant updating can be discerned where the various entries display different characteristics, such as inconsistent ink density or brush shape, uneven text arrangement, or a markedly different handwriting style. An illustrative example in the Turin collection is a large but fragmentary 'Necropolis journal'³⁷ dated to regnal years sixteen and seventeen of Ramesses IX (c. 1114–1113 BCE).³⁸ The individual entries do not appear in chronological order on the papyrus and they exhibit differences in ink and brush specifics, such as the use of black ink for some and red for others (Fig. 5). They also demonstrate clear differences in layout and text arrangement, with some texts even having been written upside down in respect to each other (Fig. 6).

³⁷ A manuscript preserving different administrative texts related to the work on the royal tombs.

³⁸ The full inventory number (in its current state) is Papyrus Turin Cat. 2082/173 + Cat. 2083/178 + Cat. 2105/368 + Cat. 2083/181 + Cat. 2067/118 + Cat. 1884 + Cat. 2073/145 + Cat. 2083/183 + Cat. 1945/002 + Cat. 2082/172 + Cat. 2076/154 + Cat. 2082/177 + Cat. 2071/137 + Cat. 2083/179 + Cat. 2076/155, <<https://papyri.museoegizio.it/o/60904>> (accessed on 18 June 2024). For the sake of simplicity, here it is abbreviated to Papyrus Turin Cat. 2082/173 +.

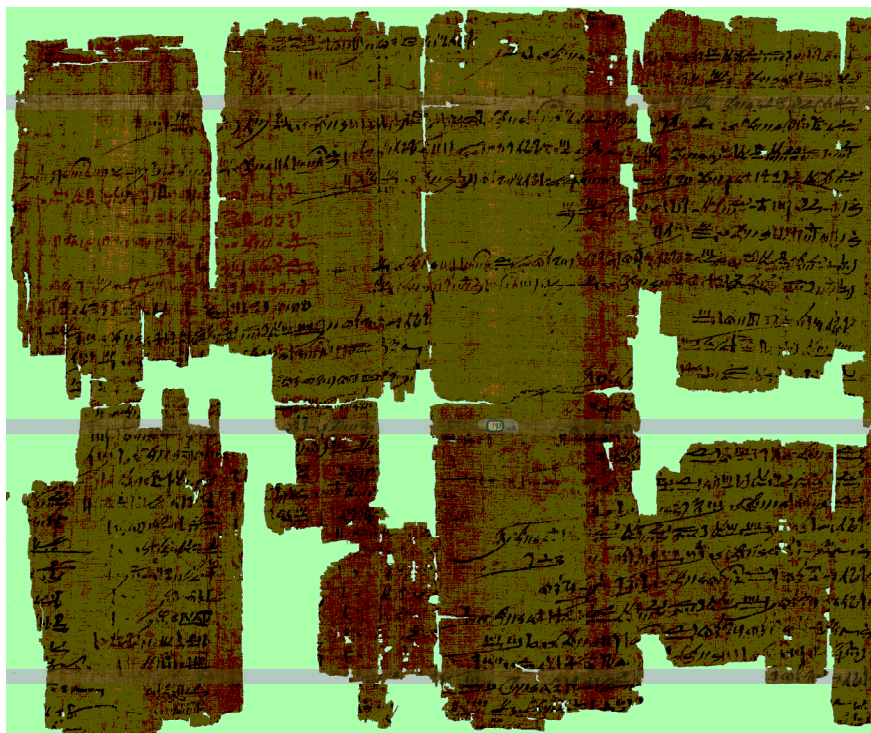


Fig. 5: Different administrative texts, one of them written in red ink (detail, central part); twentieth dynasty, Ramesses IX, c. 1114–1113 BCE; Papyrus Turin Cat. 2082/173 + verso, <<https://papyri.museoegizio.it/o/60904>>. Photograph © Scan/Museo Egizio.

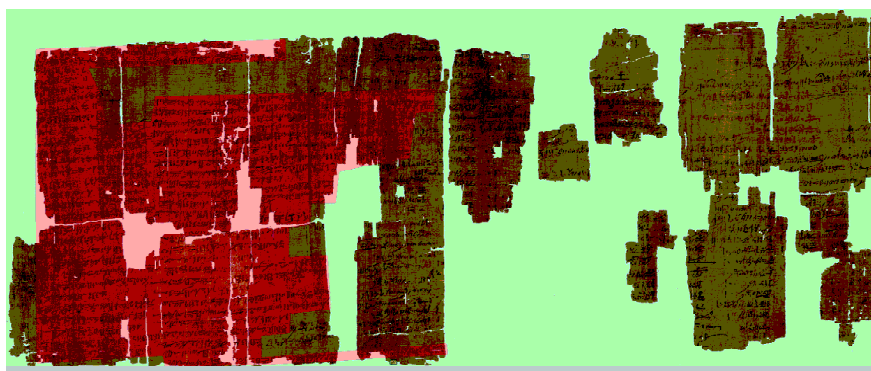


Fig. 6: Texts written upside down, marked in red (detail, left part; my markings in red); twentieth dynasty, Ramesses IX, c. 1114–1113 BCE; Papyrus Turin Cat. 2082/173 + verso, <<https://papyri.museoegizio.it/o/60904>>. Photograph © Scan/Museo Egizio.

Other manuscripts display homogeneous handwriting and have an overall well-structured appearance, suggesting that the texts were composed in a single or very few sittings. One such example is a document preserving a compilation of notes on fish deliveries to the gang of workmen at the end of the reign of Ramesses IX and the first two years of Ramesses X (c. 1111–1108 BCE; Fig. 7).³⁹ The texts in question were likely composed retrospectively, as a summary of past events, potentially based on notes in other manuscripts or on the administrators' recollections.

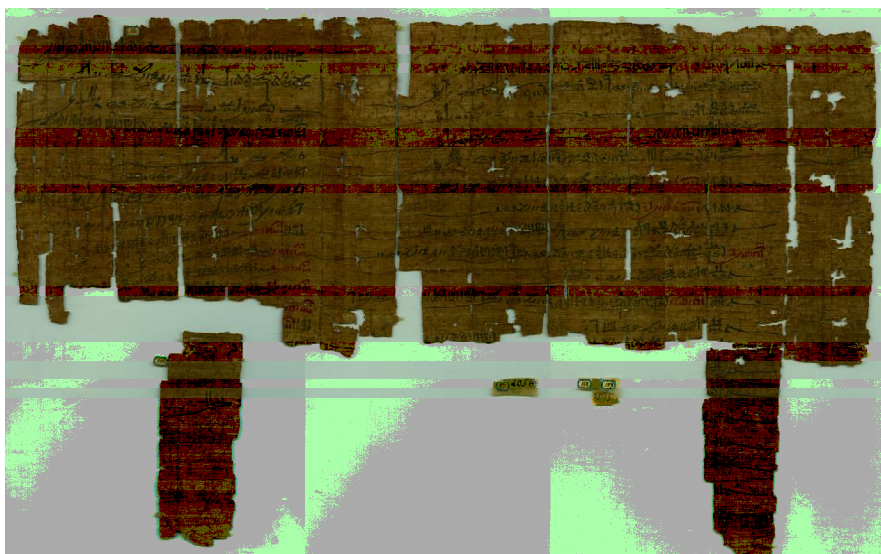


Fig. 7: A compilation of records of fish deliveries; twentieth dynasty, Ramesses IX (c. 1111–1108 BCE); Papyrus Turin Cat. 2096/263 + Cat. 2075 + Cat. 2056/057 + Cat. 2056/056, <<https://papyri.museoegizio.it/d/72>>. Photograph © Scan/Museo Egizio.

³⁹ Papyrus Turin Cat. 2096/263 + Cat. 2075 + Cat. 2056/057 + Cat. 2056/056, <<https://papyri.museoegizio.it/d/72>> (accessed on 18 June 2024). A distinctive feature of this particular manuscript is that the recto side is inscribed with a list of fish deliveries to one half of the gang, while the deliveries to the other half in the same time period are noted down by a different writer on the verso of the papyrus. This appears to be a methodical approach employed by the writers to use the papyrus' material properties to organise the contents of the text. The information is structured according to the organisational unit in which the workmen were placed, with the texts still kept together on the same carrier (Hertel 2024, 74–75).

Despite their similar content, the Necropolis journal example and the fish delivery compilation are very different in terms of manuscript development, practical use, and purpose. While the first was designed as a diary that accompanied its user, was updated regularly, and subsequently changed in appearance, the second was probably intended as a collective record for long-term storage of information for occasional consultation and was written in one go, sometime after the events it describes. Following Spiegelberg's suggestion of a correlation between reuse and intended manuscript purpose, I argue that an approach that considers the differences in manuscripts' itineraries and intended purpose – such as an alterable diary versus a stable long-term record – holds the key to better understanding of papyrus reuse in ancient Egypt, including that in Deir el-Medina.⁴⁰

If the discrepancies in physical appearance and mode of re(use) of the Deir el-Medina papyri are to be explained by the fact that some papyri were used as portable notebooks and others as archivable registers, it follows that the question of why a papyrus was reused is not primarily related to external circumstances such as the cost or scarcity of the text carrier but rather rooted in the intention of the user, with some types of use naturally involving reuse as their normal mode of operation. Of course, this assessment does not rule out the possibility that in times of great need, due to a shortage of supplies, this general structure was broken and, for example, previously archived papyri were brought back into active use if their content was no longer needed. However, this approach provides a framework for understanding reuse even in times when there was no shortage of writing material and also accounts for the coexistence of non-reused and heavily reused papyri in the same context.

4 Outlook

The first part of this paper argued that the market price of papyrus and its hypothetical affordability likely had little effect on the reuse of papyrus manuscripts in a community such as Deir el-Medina, where a large part of the writing happened on behalf of institutional administration. It seems more plausible that occasional supply shortages encouraged the reuse of older manuscripts, but the lack of concrete information on papyrus supply to the village makes it unlikely that the research can ever demonstrate this hypothesis comprehensively. A problem in in-

⁴⁰ For the value of focusing on object itineraries instead of the more common object biography, see Hahn and Weiss 2013.

terpretation is posed by the fact that the scribes in Deir el-Medina appear to have specifically selected some papyri for reuse while leaving others untouched and with large empty spaces. This difference could be explained if the reason for reusing a papyrus is seen not as an externally motivated act of necessity but as a normal component of different use modes. Such an approach requires a focus on understanding the intentions of the (re)users and the development of individual (groups of) manuscripts rather than the search for patterns or systematic practices of reuse.

This paper also suggested that a papyrus manuscript from Deir el-Medina could have been approached by an ancient writer with one of two general use modes in mind: either as a short-term memory aid that was regularly added to and possibly moved around with the user, or as a medium for the long-term storage of information written in fewer stages, sometimes even in a single sitting, and possibly stored separately from other types of papyri. This dual mode of using papyri may have been specific to some places where the administration required a great deal of text production and organisation. In considering the potential for future investigations, it may be of interest to examine whether such a dual approach could have been a general principle in the use of papyrus manuscripts in ancient Egyptian culture. This approach would be in line with the natural affordances of the material, which is both reusable and preservable. Because of papyrus' reusability, an ancient writer could approach a piece of papyrus as they would a writing board, a gesso-covered wooden tablet for easy writing and erasing, regularly used for administration and practice (Fig. 8). However, if properly stored, a papyrus manuscript could preserve a text for centuries and fulfil a function of information transmission similar to that of an inscription in stone, such as a stela or a tomb wall. This wide functionality made a papyrus manuscript an immensely versatile writing medium, which may explain both its reuse and its popularity over the long course of Egyptian history.

As a final note, it should be kept in mind that modern attitudes towards the concept of reuse may influence our research on object reuse in ancient societies and the structure and rationale behind it. The very idea that reuse requires justification is rooted in the assumption that a new object is naturally preferable to an old one, an idea promoted by the deliberate obsolescence of objects in modern consumerist society.⁴¹ In other societies, the age or degree of 'usedness' of an object may not correlate at all with its ideological or economic value. Many objects could have been reused simply because their material properties allow or even encourage reuse, making the research on the principles guiding the decision to

⁴¹ Vogel 2021, esp. 63–70.

reuse or not reuse elusive. It may be fruitful for the scholarly discourse to shift the focus of debate on papyrus use and reuse towards the study of individual manuscripts and the reconstruction of their physical development and possible reinterpretation over time. By paying attention to the clues in the material evidence and considering how these affect the circumstances of the writing and use, more evidence of individual reuse processes could be obtained and potentially lead to the formulation of a material-based hypothesis of reuse patterns in some ancient Egyptian communities.

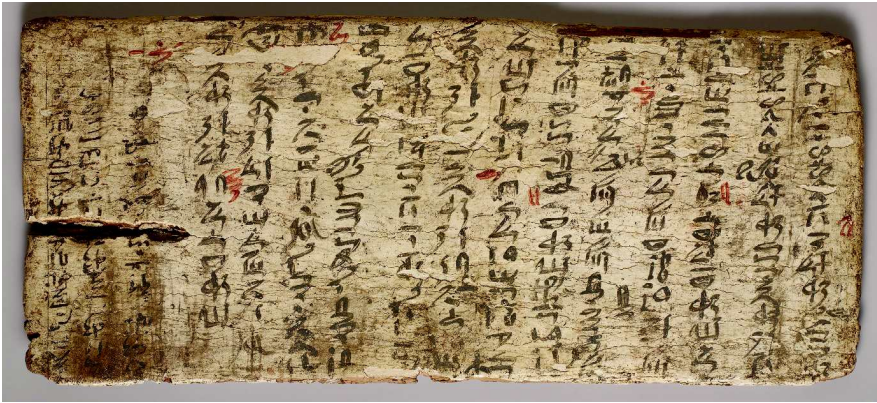


Fig. 8: Writing board inscribed with a model letter; twelfth dynasty (c. 1940–1760 BCE); Metropolitan Museum of Art New York accession number 28.9.4, <<https://www.metmuseum.org/art/collection/search/544319>>. Photograph CC0.

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Paola Buzi

Coptic Palimpsests: When, Where, and Why?

Abstract: Among the various forms of prolonging the life of Coptic manuscripts – or, better, the life of their writing supports (parchment, but also papyrus, pottery, and wood) – is the practice of scraping them or washing them off to host new text(s) and thus create a new manuscript, in a process that could theoretically never end. On the basis of an earlier and more systematic study of Coptic palimpsests (especially those from the White Monastery of Atripe), some brief further considerations are formulated here in order to highlight, by means of three specific cases, noteworthy phenomena of the reuse methods by which the life of a Coptic literary manuscript can be regenerated. This article also hypothesises that the practice of palimpsesting had more than economic rationales, and was also motivated by the *forma mentis* of Roman and late antique culture.

1 Premise, definitions, and terminology

Among the various forms of prolonging the life of Coptic manuscripts is the practice of scraping them or washing them off to host new text(s) and thus create a new manuscript, in a process that could theoretically never end.¹ It is what Elias Avery Lowe defines as the ‘fascination of palimpsests’.²

It is important to emphasise, however, that through this process it is rather the life of a writing support – parchment, but also papyrus, pottery, and wood – and not that of a manuscript, that is to be prolonged, since the effect of palimpsesting is to create an entirely new manuscript, a new written artefact.³

As is well known, manuscripts are ‘far from being stable or unchanging entities’, but may ‘evolve over the course of time, acquiring “layers” akin to archaeological strata’.⁴ Palimpsests can be seen as a particular type of multilayered writ-

1 No examples of Coptic manuscripts written three times are known to me. For comparative insights into the phenomenon of palimpsested manuscripts, see Gippert, Maksimczuk and Sarg-syan (eds) 2025, focusing especially on palimpsesting parchment (though not in a Coptic context).

2 Lowe 1964, 481.

3 For a definition of ‘written artefact’, see Bausi et al. 2023.

4 Maksimczuk et al. 2024, 1. ‘[Re-]Shaping Written Artefacts’ is the name of one of the working groups of the Cluster of Excellence ‘Understanding Written Artefacts: Materiality, Interaction, and Transmission in Manuscript Cultures’, active at Hamburg University, <<https://www.uni-hamburg>

ten artefact, where the operation of rewriting represents a new ‘act of production’⁵ or ‘production unit’.⁶

For the sake of brevity, therefore, the term ‘Coptic manuscript’ in this article is to be understood in its material sense, with specific reference to the writing support. Of course, also contents, and therefore texts, can be extended, added to, deleted from, or replaced, thus creating a new textual product, but this is not the subject of this paper.

Until a few years ago, the phenomenon of the reuse of Coptic writing supports – and parchment manuscripts in particular – was almost completely neglected and certainly numerically underestimated.⁷ This inattention, however, is fully justified by the fact that, as is well known, Coptologists have other priorities, first and foremost the need to reconstruct, at least virtually, codices dismembered in the past (often in a recent past) – a state of affairs that affects the majority of the Coptic manuscript heritage.⁸

Today we can say that more than sixty Coptic palimpsest literary manuscripts are known to us (out of about 6,000 identified codicological units datable between the third and fourteenth centuries).⁹ Their compilation, however, is a work in

de/en/forschung/forschungsprofil/exzellenzcluster/understanding-written-artefacts.html>. All URLs in this article were last accessed on 5 February 2025.

5 Maksimczuk et al. 2024, 3 and 5: ‘Both the removal of folios from a WA [written artefact], and the subsequent washing- or scraping-off of the writing could be interpreted as (negative) secondary layers, of the original WA and the removed individual folios, respectively. However, the original WA would in many cases be destroyed during this process and the individual folios would also cease to be WAs, as soon as the writing is removed from them’.

6 Andrist, Canart and Maniaci 2013, 59–61.

7 This does not mean, of course, that Coptic palimpsests had not been identified and described at all (see e.g. van Lantschoot 1928), but a systematic study has long been lacking. For a further bibliography, see Buzi 2022. For palimpsests in the Latin West see Declercq (ed.) 2007, with a census of the examples produced before 800 (p. 12).

8 For the emblematic case of the White Monastery manuscripts, see Orlandi and Suciù 2016.

9 Recently, thanks to a systematic classification of Coptic literary codicological units, published in a database that represents the main scientific achievement of the European Research Council-funded project PATHs (project number: 687567; <<https://atlas.paths-erc.eu/>>), it has been possible to re-evaluate the phenomenon in a global perspective and to make some preliminary observations on the second life of Coptic manuscripts. It is important to emphasise that the ninety-five palimpsests currently appearing in the ‘saved query’ for ‘palimpsests’ in the PATHs database (<https://atlas.paths-erc.eu/search/manuscripts/saved?q=palimpsest_ms>) actually correspond to sixty-nine physical manuscripts, since the database records and classifies the *scriptio inferior* and *scriptio superior* separately, whenever possible, as single codicological units (i.e. two or more codicological units may correspond to a palimpsest codex). However, if the *scriptio superior* or

progress¹⁰ due to the complexity of reconstructing the original Coptic codicological units already mentioned as well as due to the many fragments, preserved in different institutions, still awaiting identification and proper study.

The Coptic palimpsests identified so far cover a period between the mid sixth and fourteenth centuries, a datum that allows us to easily answer the first question in this article's title: *When?*

It seems reasonable, therefore, to state that this phenomenon occurred throughout the history of Coptic book production, at least as far as parchment is concerned.¹¹ It is a recurring practice and not strictly linked to a particular period of economic crisis, an unstable political situation, or the temporary difficulties of a particular *scriptorium*, although this cannot be ruled out and should be assessed on a case-by-case basis. In any event, it is a fact that there are no temporal breaks in the practice of prolonging the life of written artefacts.

The answers to the second question, *Where?*, and the third, *Why?*, are more difficult. While many Coptic palimpsests are certainly from the library of the White Monastery of Atripe or other monastic contexts, other manuscripts acquired on the antiquities market are of uncertain origin. Nevertheless, it seems plausible that most of them were reused in and for monastic contexts, at least as far as their second lives are concerned.

What follows does not pretend to be a global study of Coptic palimpsests; instead, it offers some additional reflections focusing on the various possible modal-

scriptio inferior is in Greek, Arabic, or non-literary, this codicological unit is not included in the *Archaeological Atlas of Coptic Literature* and is only mentioned in the 'Notes on Palimpsest' record.

10 A first result of the study of Coptic palimpsests – in part already obsolete – is the already mentioned Buzi 2022. Other palimpsests from the White Monastery, for example, have been identified by Alin Suci and Frank Feder in the course of their autoptic analysis of the Coptic fragments preserved at the University of Michigan Library, Ann Arbor, carried out as part of the activities of the 'Digital Edition of the Sahidic Old Testament' project (<<https://apps.lib.umich.edu/online-exhibits/exhibits/show/coptic-manuscripts/palimpsests>>). They are Ann Arbor, MI, University of Michigan Library, Mich. Ms. 112 (= CLM 2365); Mich. Ms. 118 (= CLM 3147); and Mich. Ms. 158.37 (= CLM 4578).

11 Papyrus is not excluded from the phenomenon of reuse in Coptic, but it is generally more difficult to detect because the action of the sponge tends to eliminate the underlying text almost completely. Among the exceptions are four documentary fragments corresponding to London, British Museum, EA 74952, which include a complaint against a monk. In this case, the *scriptio inferior* is still very visible. See Crum 1921, no. 175. For palimpsested Greek papyrus codices, see Schmidt 2009. For a palimpsested papyrus (London, British Museum, EA 10856.3 + Copenhagen, Københavns Universitet, The Carlsberg Papyrus Collection, P. 425), datable to the fourth/third century BCE, with Demotic text ('Demotic Name-book' on the recto, account on the verso), see Martin 2016–2017. On palimpsesting papyrus, see also Elena Hertel's contribution to the present volume.

ities – in terms of reuse techniques – with which the life of a manuscript was prolonged and regenerated, in an attempt to single out at least some contexts (*Where?*) and objectives (*Why?*).

Even in this specific sense, this essay is intended not to be exhaustive but merely to highlight, by means of three examples, certain phenomena that I consider noteworthy in order to stimulate further study of the economic *forma mentis* behind the book production of late antique and medieval Egypt.

2 Case 1: Biblical texts on top of biblical texts

In terms of content, reuse of a biblical (as well as liturgical) manuscript to transcribe another biblical text was a common, although not systematic, practice. For example, two manuscripts from the monastery of St Thomas in Wadi Sarga, both originally containing the Gospel of John, were reused for another biblical text. The first was later rewritten to contain the Acts of the Apostles – and reduced in size in the process – while the second was reused for another Gospel of John.¹²

This last example is more intriguing to us: Why write a new Gospel of John when you already have one? Because the original codex had deteriorated? Because the writing was aesthetically obsolete? These are aspects that still await proper and systematic study, but it is a matter of fact that several *scriptiones inferiores* of Coptic manuscripts are of biblical content, although not necessarily overwritten by another biblical text.

To provide some figures in the case of the White Monastery, seven out of thirteen palimpsests have a biblical or a liturgical text as *scriptio inferior*.

In general, late antique Christian circles seem to have been more permissive in palimpsesting biblical codices than Islamic circles were, as Éléonore Cellard and Catherine Louis observe. For instance, Ibn Abī Dāwūd al-Sijistānī (d. AH 316/928 CE) states in his *Kitāb al-Maṣāḥif* (*Book of Qurʾān Codices*) that it is permissible to erase and reuse the leaves of biblical manuscripts only if they are no longer identifiable.¹³

It is worth observing that biblical manuscripts suffered the same fate in the Latin manuscript tradition, at least until the ninth century, since ‘among the texts

¹² London, British Library, Or. 9035(1)–(2) = CLM 831 <<https://atlas.paths-erc.eu/manuscripts/831>> and CLM 6607 <<https://atlas.paths-erc.eu/manuscripts/6607>> = TM/LDAB 108068. Layton 1987, 39 (no. 35) and 43 (no. 40).

¹³ Cellard and Louis 2020, 41.

that were erased in this way before 800, classical authors dominate (27.5%), followed by the Bible (17.5%) and patristic literature (12.5%)'.¹⁴ It could even happen that classical authors covered biblical texts.

In short, even the most sacred texts were not exempt from reuse. It remains to be understood why this was the case (Obsolescence of the script? Wear and tear of the book as a written artefact?) and why a new writing support was not used (Cost? Natural inclination to recycle?).

3 Case 2: From one language to another

Language changes from the first to the second life of a manuscript are also documented, although not so frequently.

Of particular interest is the Coptic codex of five books of the Old Testament, published by Herbert Thompson in 1911, which was later reused to house a Syriac text.¹⁵ Acquired by the British Museum in London in 1847, it is a striking example of the complex fate that can befall a codex. When it was reused to write a Syriac text – consisting of excerpts from John Chrysostom, Evagrius Ponticus, and others – the original order of its leaves was mixed up. In addition, the Syriac scribe did not have enough textual material to fill all the leaves of the original Coptic codex, so forty-two folios were discarded or used for another purpose.¹⁶

The new codicological unit is composed of 187 leaves, one of which (fol. 52) bears Syriac writing, but no traces of Coptic text or even a page number. This suggests that it was probably one of the flyleaves of the original codicological unit.¹⁷ While the *scriptio superior* can be dated precisely to 913, the *scriptio inferior* is much harder to date, although the middle of the sixth century seems plausible.¹⁸

Similarly, while it is reasonable to say that the place where the codex's second life was initiated was the Monastery of the Syrians in Wādī al-Naṭrūn, we have no clue as to the origin of its first life. Should it be attributed to the same monastery when it was still the property of a Coptic community? Was the Coptic book collec-

¹⁴ Declercq (ed.) 2007, 13.

¹⁵ London, British Library, Add. 17183 = CLM 769 <<https://atlas.paths-erc.eu/manuscripts/769>> = TM/LDAB 107762. Schüssler 1995, 97–98 (sa 19); Thompson 1911, with bibliography; Crum 1905, 4–7 (no. 12).

¹⁶ See Thompson 1911, vi, for what exactly is missing from the original Coptic texts.

¹⁷ Thompson 1911, viii: 'Thus 186 plus 52 missing folios gives us 228 (= 456 pages) as the number of the original written leaves'.

¹⁸ However, the dating of the Coptic text is disputed. See Orsini 2008, 138–139.

tion of the older monastery used as a 'lending library' to obtain writing materials for the new Syriac production? An intriguing hypothesis of internal reuse that unfortunately cannot be confirmed.

In other cases, a Greek text covers a Coptic one. This happens, for example, with Florence, PSI XIII 1296,¹⁹ found in Antinoupolis in 1937 by Evaristo Breccia; its exact context of discovery in the city is unknown. Was it from a non-monastic library? This seems likely, given that no real monastic structures have been found at the site and many fragments, also recently, have been found in the necropolises, thus suggesting it could be part of a deposition.

The eight fragmentary parchment leaves, dated between the sixth and eighth centuries, contain a mixture of biblical and secular texts (for example, the length of the day and night in the Egyptian months) in a strange combination whose scope is not easy to evaluate and explain. The underlying Coptic text is unfortunately unidentifiable and difficult to date.²⁰

Similarly, in Vienna, Österreichische Nationalbibliothek – Papyrussammlung, P. Vindob. G 31487 (90), the first Epistle to Corinthians (sixth century), in Sahidic, is covered by a hymn on Palm Sunday, in Greek (seventh century?).²¹

Finally, Salem, OR, Corban University, Prewitt-Allen Archaeological Museum, P. Allen s.n. contains the *Sapientia Salomonis* (CC 0761), in Sahidic (seventh century?), which covers Virgil's *Georgics*, I, vv. 229–237, in Latin with Greek translation (fifth century).²²

Although these are only but a few examples, they are enough to suggest that the reused written artefacts did not necessarily come from the same cultural or institutional context as the respective original manuscripts.

Moreover, the case of the Virgil manuscript is particularly interesting, because it may not have belonged to a monastic or ecclesiastical context (although it is necessary to admit that we do not know much about early monastic libraries

¹⁹ TM 61688; LDAB 2839.

²⁰ Turner 1977, 163. According to Guglielmo Cavallo, the first text dates back to the third century CE. See Cavallo 1967, 120–121, Table 110. See also Naldini 1965, 20 (no. 23, Table XVI), 25 (no. 30, Table XIX); van Haelst 1976, 564 (nos 567 and 629); Pintaudi (ed.) 1983; Cavallo and Maehler 1987, 64, Table 28b; Manfredi 1998, 113–114, no. 12, <<https://psi-online.it/documents/psi;13;1296>>, last accessed 1 August 2024; Del Corso 2015; Orsini 2019, 148–150.

²¹ Vienna, Österreichische Nationalbibliothek – Papyrussammlung, P. Vindob. G. 31487 = CLM 6610 <<https://atlas.paths-erc.eu/manuscripts/6610>> = TM 88394 for the Coptic text; TM 64806 for the Greek text; Grassien 1999. See Crisci 2003, 78.

²² P. Allen s.n. = CLM 6532 <<https://atlas.paths-erc.eu/manuscripts/6532>> = TM/LDAB 109378. Acquired in 1953 from an antiquities dealer in Cairo by Robert S. Allen (†1997), the manuscript was moved, in 1985, to the Prewitt-Allen Archaeological Museum, Salem, OR.

and their book patrimony). If this hypothesis is correct, we must imagine that the writing support was purchased from wastepaper dealers.

4 Case 3: A second life born of many first lives

A new manuscript may derive from several older ones, although only a few examples of this practice are extant or have been identified, at least to my knowledge. London, British Library, Or. 4717.5 preserves a rewritten parchment codex, the eight surviving leaves of which contain the Books of Isaiah and Hosea.²³ Their provenance is very uncertain, as Walter E. Crum attributes them to the Graf Collection, which ‘was declared by the native sellers to come from the Fayyūm and Akhmim; but it was bought in Cairo’.²⁴ These contradictory data on its origin do not diminish the interest of the palimpsest, which contains Old Testament books in Coptic, a gospel lectionary in Greek (fols 4a–b) and, more interestingly, legal texts in Latin (fols 1, 3, 7).²⁵

It is plausible that, in this particular case, the first life of part of the reused parchment codex should be sought in an urban context, and more specifically in an area where Latin – and legal texts in Latin – had a *raison d’être*. The Fayyūm is a perfect candidate in this respect, since many complaints and conflicts were settled there by the local administrative hierarchy,²⁶ without even considering the significant presence of Roman veterans resident in the Arsinoites nomos, who continued to use Latin, albeit at different levels of proficiency, as several imperial and late antique archives also attest.²⁷

This codex from the British Library, however, is not the only example of manuscripts obtained from several codicological units. In the manuscript Vatican

²³ CLM 1384 <<https://atlas.paths-erc.eu/manuscripts/1384>> = TM/LDAB 108187 = LCBM 2154.

²⁴ Crum 1905, xxiii, n. 1.

²⁵ Serena Ammirati is working on the exact identification of the legal texts. See Ammirati 2017 and <<https://atlas.paths-erc.eu/manuscripts/1384>>.

²⁶ For such a role of the Fayyūm also in the Umayyad Period, see Reinfandt 2015. For earlier periods, see Kruse 2019, 119–138. During the Roman Empire, the visit of a *praefectus Aegypti* was ‘an opportunity for the local population to hand over petitions directly to the prefect: an opportunity that must have been widely taken, since in a document dated around AD 209 we are informed that the governor Subatianus Aquila, during his stay in the capital of the Arsinoite nome (in the course of a *conventus*), received in a little less than three days no fewer than 1804 petitions (P.Yale I 61)’. Kruse 2019, 121–122.

²⁷ On the archive of the *praefectus alae* Flavius Abinnaeus, see Bell et al. 1962. On the circulation of Latin literary manuscripts in the Fayyūm, see Buzi 2004. See also Kaimio 1979.

City, Biblioteca Apostolica Vaticana, Borg. copt. 109 cass. XIX fasc. 73 sup.,²⁸ the text of the *scriptio superior* makes use of (at least) two older codicological units, a fact that once again sheds light on the reasons for which a new codex might have been produced. In this case, the codicological unit of the *scriptio superior* consists of six damaged leaves whose text, distributed over two columns, contains John 12:36–13:2 and 19:38–21:23. The first leaf (corresponding to pp. 59–60) is detached from the others, which are consecutive (pp. 99–108). It has been calculated that about nineteen leaves are missing between (modern) folios 1 and 2.²⁹ All the margins are severely damaged, especially those of the first leaf, the outer column of which is partially lost. The handwriting is inelegant, irregular, and right-sloping. However, these irregularities do not seem to be due to different hands but rather appear to be the imprecisions of the same copyist, whose work Giuseppe Balestri dates to the thirteenth/fourteenth century.³⁰ Furthermore, the *scriptio superior* of folios 1 and 4 has been written by turning the leaves upside down compared to the first phase of the manuscript's life. One of the earlier codicological units reused (CLM 1695), consisting of three damaged and not consecutive leaves, bears the *Miracula Philothei* (CC 0234) or possibly the *Passio Philothei* (CC 0296).³¹ The script, an Alexandrian majuscule, may date from the tenth century. The erased text of folios 1, 3, and 4 (CLM 6586) cannot be identified. It is written in two columns, and although the script – an inelegant Alexandrian majuscule – is very similar on the three leaves, we can only hypothetically say that we are dealing with a unique codicological unit.

Coptic palimpsest codices may use different older manuscripts, but where were they found or bought? From the same seller of waste parchment? Were there specialised 'shops' for recycled writing materials? And what about bindings? Was it possible to buy an old binding and adapt it to a new codex?

²⁸ Sauget 1972, 43 (no. XXIII*); Schüssler 2006, 24–27 (sa 564); Balestri 1904, xxxviii–xliii.

²⁹ For the hypothetical reconstruction of the codex, based on autoptic analysis and Schüssler 2006, 24, see <<https://atlas.paths-erc.eu/manuscripts/2395>>.

³⁰ Balestri 1903.

³¹ The general content was identified by Balestri when he was working on the fragments of the New Testament belonging to Cardinal Borgia. At that time, the *scriptio inferior* 1 was certainly more legible than it is today: 'Questa, di color flavo, in buona parte è di facile lettura; altrove poi la membrana è così stata raschiata che non mi è riescito [*sic*] decifrare cosa alcuna' ('This text, of blond color, is easy to read; elsewhere the parchment is so scratched that I could not decipher anything', Balestri 1903, 61 and Balestri 1904, xxxviii–xliii). On the relationship between this text and that transmitted by Berlin, Staatliche Museen zu Berlin, Ägyptisches Museum und Papyrus-sammlung, P. 9755, see Vergote 1935.

Because of the lack of information regarding the market for materials used in the production of the codex, it is not easy to answer these questions, including in terms of archaeological data. Despite this state of affairs, however, it is possible to make some hypotheses, as we shall see.

5 The many ways of reusing a codex: A few considerations

The few cases briefly described here – selected with no claim of being exhaustive, as already explained, but rather to emphasise specific phenomena considered particularly worthy of further investigation in the future – illustrate how the ways a manuscript can be reused can vary across time, languages, book cultures, techniques, and, most importantly, areas of function and textual dignity. In this regard, it is significant that a biblical manuscript, held in the Beinecke Library in New Haven, Connecticut, was reused for a Coptic magical text.³² We can therefore repeat that the biblical content of a book did not guarantee its preservation and, more surprisingly, that the reuse of biblical manuscripts for profane purposes was also contemplated.

There are, of course, cases of the reuse of classical texts, in Greek, to accommodate documentary texts; Durham, NC, Duke University Library, P. Duke inv. G 5 is one of the most notable cases. It is a parchment leaf from a codex whose *scriptio inferior* transmits Plato's *Parmenides*, 152 b–d (fifth century CE), while its *scriptio superior* contains a private letter in Coptic,³³ again suggesting a shift in the context of use and belonging from the first to the second life of the manuscript. And, why should this not be the case, with the existence of specialised 'centres' where it was possible to procure parchment for reuse?

However, the most interesting case of a reused biblical manuscript is the Copto-Qur'ānic Palimpsest, sold by Christie's auction house in 2018, which consists of nine folios of very thin and light parchment. As its editors observe, 'Because its biblical lower (i.e. erased) text is in Coptic, the qur'ānic upper text is likely to have been written in Egypt'.³⁴ Catherine Louis goes beyond this first assertion and, on the basis of a precise comparison, limits the area of production of the original

32 New Haven, CT, Beineke Rare Book and Manuscript Library, P.CtYBR inv. 846, f. 1 = CLM 6339 <<https://atlas.paths-erc.eu/manuscripts/6339>> = TM/LDAB 108028; 111279; Emmel 1990.

33 Willis 1971; Willis 1974.

34 Cellard and Louis 2020, 44.

(Coptic) codex to what is known as Middle Egypt. The *scriptio inferior* contains ‘non-consecutive excerpts from Deuteronomy and two others non-consecutive excerpts from the book of Isaiah’. According to Louis, the parchment leaves would have been part of ‘a multi-volume Bible produced within the Coptic community before the rise of Islam, probably during the sixth century’.³⁵ The leaves ‘may be estimated to have measured 220 mm high by 165 mm wide. Each one of them was trimmed in the margins, and folded or cut in two’.³⁶

Rotating folios at an angle of 90 degrees to produce smaller folded bifolios was a common practice. The normal effect is that the new text appears perpendicular to the *scriptio inferior*, although this is not always the case.

In general, it can be said that a large number of Coptic palimpsests imply a reduction in the original dimensions of the reused codex. Such a phenomenon is easy to explain, especially when a long period of time occurred between the first and second use. In this case, the margins often would have been worn and in need of trimming.

Although a systematic and empirical study of the technical aspects of palimpsests is still lacking, Coptic palimpsests seem to have been obtained not by erasing the previous text, and thus the surface of the manuscript, but by simply washing the pages. The first method would have rendered the *scriptio inferior* illegible by physically removing it.³⁷ On the contrary, most of the surviving palimpsests clearly reveal the lower writing layer.

6 Parchment reuse as part of a circular economy? A hypothesis not to be dismissed a priori

We still need to try to answer the last question – *Why?* – and the answer may not be so obvious. The cost and availability of parchment certainly played a major role in the phenomenon of reusing older writing surfaces, but recycling probably was not only an economic matter but also a *forma mentis*, a natural inclination, that clearly went beyond book production.³⁸

³⁵ Cellard and Louis 2020, 95.

³⁶ Cellard and Louis 2020, 47.

³⁷ On this technical aspect, see Cellard and Louis 2020, and in particular nn. 75–77.

³⁸ Maniaci 2015, 189. For reuse and ‘renovation’ – urban, architectural, artistic, etc. – between the Roman and late antique worlds, see Ng and Swetnam-Burland 2018. On the insufficiency of

Late Antiquity shows several aspects of a circular economy. Remaining in Egypt, we have examples of mud bricks – certainly not a precious or rare object – that originally belonged to Ptolemaic temples and were later reused in the foundations of Christian churches, despite their low cost and ease of implementation.³⁹ Similarly, funerary stelae – often Christian stelae – were relocated to create new floors in both urban and monastic contexts. Such reused monuments even appeared in communities that clearly had no shortage of funds, such as the monastery of Abba Nefer at Manqabad and the monastery of Jeremiah at Saqqara. Moreover, Simon J. Barker has convincingly argued that, beyond economic reasons, the reuse of even statues had ideological motives.⁴⁰

Remaining in the field of book production, several examples of recycled and adapted bookbindings can be identified, suggesting that this was also a common phenomenon.

The reuse of a leather binding adapted to a smaller codex has been well documented and described by Myriam Krutzsch and Günter Poethke.⁴¹ Likewise, several bindings from the Edfu codices were adapted to a new use by gluing a new cover over them, creating a double board structure.⁴² The clearest case is that of London, British Library, Or. 7024,⁴³ where the wire for hanging the single sections of the cover is clearly visible, passing over and through the old leather cover.⁴⁴

In addition, the binding of London, British Library, Or. 3367 was turned 180 degrees and then rebound in leather.⁴⁵ And several further examples could be listed.

It is undeniable that these forms of reuse were mainly designed to save money, but this does not rule out other motivations, because, as Barker put it, ‘reuse-

strictly economic criteria for explaining the phenomenon of palimpsesting, see also Elena Hertel’s contribution to the present volume.

³⁹ Among the many examples that could be cited, this is what happened with the mud bricks of Temple A (third century BCE) at Bakchias (Fayyūm), dedicated to Soknobkonneus, which were reused in one of the two late antique churches of the site. See Buzi and Giorgi 2020, 82–85. For a similar phenomenon in third-millennium Mesopotamia, see Molina and Steinkeller 2023, 41. I thank Michele Cammarosano for bringing this article to my attention.

⁴⁰ Barker 2020.

⁴¹ Krutzsch and Poethke 1984 (T6).

⁴² Lindsay 2001; Lindsay 2023.

⁴³ CLM 193.

⁴⁴ A similar practice is detectable in the bookbindings of New York, NY, The Morgan Library and Museum, (CLM 232; <<https://atlas.paths-erc.eu/manuscripts/232>>) and (CLM 6544; <<https://atlas.paths-erc.eu/manuscripts/6544>>).

⁴⁵ I am grateful to Eliana Dal Sasso for this information and, more generally, for discussing with me the cases of reused bookbindings.

recycling was also a cultural choice rather than a purely pragmatic practice, and one that expressed a late antique mentality'.⁴⁶

Especially in critical political moments, such as when the central power was less effective, reusing even old luxury codices, scraping or washing their previous text(s), and adapting their dimensions to new requirements might have seemed a logical and natural choice, in addition to an economical one. In addition, when demand for books was high, recycling could be a quicker way to provide writing materials.

To cite just one example to support this statement: it has been convincingly demonstrated that the large number of palimpsests produced at the Abbey of Bobbio in Late Antiquity cannot be explained by its alleged poverty, since it is hard to believe that a monastery protected and supported by the Lombard kings, and therefore a well-established institution, would have needed to save writing surfaces for reasons of economic necessity only. It is more likely that the demand (for books) was greater than the ability to obtain new parchments, and therefore the recycling of waste parchment was considered a practical option. Therefore, 'palimpsesting appears to have been an integral part of management of a book collection'.⁴⁷

As for other economic considerations, based on our current knowledge of the Coptic manuscript tradition, it is possible to assert that, firstly, it is highly unlikely that animal skins were processed into parchment long before its practical use; in such a case, parchment might have deteriorated (humidity might have corrugated the surface, insects might have caused physical damage, etc.). Secondly, in general, it is easier to imagine internal reuse when significant time passes before the second life of a manuscript. And, thirdly, the fact that a large group of Coptic palimpsests come from the library of the White Monastery in Upper Egypt and date from a late period (eleventh–fourteenth centuries) – and thus represent a form of cultural resistance, as the use of Coptic, both as a spoken and written language, had drastically declined by that time – suggests that the economy of book production in the White Monastery was most likely internal, that is, involving reuse of the writing media already available to the cultural centre. Therefore, in this specific case, we can surmise the reuse was mainly based on economic need. But things are not always so linear and obvious.

More generally, although there is no direct evidence of it, it must have been a common practice in book production to take inventory from time to time and identify books that, for various reasons (overuse, mechanical damage, disinterest

⁴⁶ Barker 2020, 105.

⁴⁷ Declercq (ed.) 2007, 20.

in the content, etc.), could be sacrificed to create new ones. Biblical codices have not escaped this fate, as we have seen.

There are, however, exceptions to this trend. The library of the monastery of Macarius in Wādī al-Naṭrūn, for example, does not seem to have produced any palimpsests. Until proven otherwise, of course.

At this stage, it is not possible to say much more about the reasons for the longevity of some Coptic writing supports and their consequent reuse to create new manuscripts. However, it is desirable – and plausible – that in the near future our knowledge of Coptic palimpsests will improve thanks to a parallel contribution: on the one hand, the identification of more examples of reused manuscripts (and consequently the methods for prolonging the life of their writing supports) and, on the other, the desired archaeological identification of wastepaper ateliers, which would allow us to understand the dimension of the phenomenon and the modality of the sale of writing supports.⁴⁸

If the first aspect depends mainly on the dedication of Coptologists specialised in codicology and manuscript studies, then the second, I am afraid, is entirely in the hands of fate.

Abbreviations

CC = *Clavis Coptica*, <www.cmcl.it/~cmcl/chiam_clavis.html> <atlas.paths-erc.eu/works>.

CLM = Coptic Literary Manuscript Unique Identifier of Coptic literary manuscripts, attributed within the framework of the PATHs project, <<https://atlas.paths-erc.eu/manuscripts>>.

LCBM = List of Coptic Biblical Manuscripts, IDs attributed by the ‘Coptic Sahidic Old Testament’ project, Göttingen.

LDAB = Leuven Database of Ancient Books, <www.trismegistos.org/ldab>.

PATHs = ‘Tracking Papyrus and Parchment Paths: An Archaeological Atlas of Coptic Literature, Literary Texts in Their Original Context, Production, Copying, Usage, Dissemination and Storage’

TM = Trismegistos, <www.trismegistos.org>.

⁴⁸ So far, there are no direct references in the sources or specific archaeological contexts identifiable as such ‘enterprises’, but their existence seems very logical to me, due to the cost of writing paper. On wastepaper merchants, see also Piwowarczyk and Wipszycka 2017.

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Sara Fani

How to Erase Writing According to Recipes from the Arab World: Textual Analysis of Premodern Technical Recipes

Abstract: This study examines how the erasure of writing is technically described in premodern Arabic literature, situating these practices within their historical, codicological, and literary contexts. Focusing on durability and stability – two key aspects of textual transmission – it explores how erasure techniques were recorded and transmitted across various literary genres, including chancery manuals, bookmaking treatises, and handbooks on craftsmanship and entertainment. The study also investigates intertextual correspondences and technical variants in recipe compilations, revealing the fluidity of these textual traditions. Ultimately, this research sheds light on the interconnectedness of different literary genres and the broader intellectual engagement with the manipulation of natural elements across diverse fields of knowledge.

1 Introduction: Durability and stability of the written texts

In a society traditionally grounded in the oral transmission of knowledge, such as the Arabo-Islamic one, writing became deeply entrenched and developed in close connection with physically preserving the most important text in Islam and its fundamental pillar, the Qur'an. The primary concern among early Muslims was the potential loss of the Revelation with the death of the Prophet Muḥammad and his closest companions, many of whom perished during the first battles of territorial expansion. This issue, as perhaps is unnecessary to emphasise, was related not only to the content of the Qur'anic revelation itself but also to its form – namely, the language, with its prosodic structure (*sağ'*), and the order in which it was transmitted. This transmission was regarded as the Word of God, and from that moment on, it became the central normative text for every aspect of Muslim life. Islamic tradition recounts how, in the early years of Muḥammad's Revelation, his companions and followers began recording the Qur'anic message through private and partial annotations on various writing materials, whose selection was often determined by the circumstances at hand. These early records were not necessari-

ly intended to be permanent but rather served as aids to the Arabs' proverbial memory, which, in the first generations, was the primary authoritative means of textual preservation. The defective nature of the Arabic writing system, the absence of diacritical marks, and the interferences of spoken Arabic with its many regional peculiarities, during the territorial expansion of the Islamic caliphate, contributed to the proliferation of textual variants in the effort to preserve the Qur'an in written form. According to the tradition, it was only with the third caliph, 'Utmān ibn 'Affān, between 650 and 656, that an official version of the text was established, accompanied by an order to destroy all other circulating versions. Nevertheless, these parallel versions continued to spread, and, as a result, the official version of the Qur'an was established with a degree of tolerance for different readings, or *qirā'āt*.¹

This brief excursus on the transmission of the Qur'anic text aims to highlight how this event, in addition to marking the foundational moment of Islam, also serves as a paradigm for a mode of knowledge transmission that has become deeply ingrained in the tradition. It reflects the dual channels of expression and dissemination of the text – oral and written – already embedded in the ambivalence of the Arabic term *qur'ān* (which signifies both recitation and reading). This duality persists to this day, as the Qur'an continues to be not only a written text (no longer confined to manuscript books) but also a memorised text in Qur'anic schools and beyond. Moreover, it implicitly addresses certain crucial concerns that constitute central topics of the discussion presented in this paper. Specifically, two main issues emerge from the various phases leading to the canonisation of the Qur'anic text in its final form, highlighting two aspects of its transmission: durability, with particular reference to the media, including material supports, through which the text was conveyed; and fixity or stability, referring to the text's adherence to the original Revelation, which, however, was first received and then communicated orally. It is also noteworthy that, according to Islamic tradition, the written dimension of the Revelation already coexisted with its oral counterpart, as it is believed to be preserved on a celestial tablet.² These concerns – namely, the duration of a text across time and space and the stability of its original content and form – alongside the coexistence of oral and written transmission modes

¹ As a general reference on the different aspects of the transmission of the Qur'an, see Tottoli 2021, 157–188, with a comprehensive bibliography, and particularly Nasser 2013 and Déroche 2019. On the canonisation of the Qur'an, see also Nasser 2020 and Halaseh 2024. For a detailed discussion on the multistage process of Qur'anic orthography stabilisation, which began as early as the fifth century, see van Putten 2023.

² Tottoli 2021, 225–229, § 4.2.2.

were by no means limited to the Qur'an or other normative textual traditions, such as *ḥadīṭ* collections (the normative traditions related to the Prophet Muḥammad), which typically begin with the chain of their transmitters. On the contrary, these concerns quickly extended to all textual production, encompassing the various literary genres of Arabo-Islamic literature. For a long time, the very modalities of knowledge transmission, including the copying of manuscripts, were based on a complex system of certifications that also involved oral auditions, alongside text collation with its antigraph and, at times, other witnesses. These various stages provided opportunities for scribes and copyists, or later readers, to modify the written texts, leaving – or sometimes trying not to leave – visible traces of their interventions in erasing and rewriting on the same support.³

Thus, in the early centuries of Islam, a period in which both script and scribal practices developed rapidly and writings proliferated alongside the techniques and crafts related to book production, authors confronted these crucial aspects and engaged with these two themes in various ways and at different levels. This study seeks to introduce Arabic sources that convey these procedures from a technical perspective, situating them within their historical, codicological, and literary contexts while shedding light on specific aspects of their transmission. It is coordinated with the contribution of Claudia Colini and colleagues in this volume, which focuses on replicating a selection of these procedures and analysing the results obtained, taking into account the crucial textual variants in their transmission that have been here identified.

The following sections highlight the two fundamental concepts – durability and stability – that underpin writing practices and their relation to erasure techniques, as well as their close connection to the foundational written monument of Islam, the Qur'an, plus other normative texts and beyond. In particular, Section 2 examines how the concept of 'durability', referring to writing supports and inks, is addressed in technical treatises on bookmaking and in *adab* literature (erudite prose on administration and etiquette). It explores the various ways this concept is approached and manifests in copying, didactic, and ritual practices, as well as its particular significance in contexts of entertainment and deception. The concept of 'stability' is addressed in Section 3, which illustrates two main trends for textual modification and erasure, as described in Mamluk chancery manuals. Section 4 provides an overview of erasure procedures transmitted in technical recipe collections, categorised according to erasure methods, ink and support types, or their

3 On the modalities and places of knowledge transmission in premodern Arabo-Islamic context, see Eche 1967; Pedersen 1984; Berkey 1992; Messick 1993; Chamberlain 1994; Atiyeh (ed.) 1995; Capezzone 1998; Hirschler 2012; Behrens-Abouseif 2019.

contexts of use. Finally, Section 5 examines the transmission dynamics of these textual units and their fluid tradition, as represented in Appendix 1, through three case studies. Each case study highlights textual and/or technical variants identified through an intertextual analysis, illustrated in Appendix 2.

2 The durability of writing supports and inks

General advice on bookmaking and scribal practices, along with more specific instructions on text compilation and copying, can be found in various genres from the ninth century CE onwards. These include works on *ḥadīṭ* transmission, chancery treatises, and more encyclopaedic *adab* literature, all of which address the material issue of durability, either directly or indirectly.⁴ Only a few works, specifically focused on craftsmanship, offer more detailed and practical insights into the subject. These works, spanning geographically from Yemen to al-Andalus and dating from the tenth to the fifteenth centuries CE, cover a wide range of crafts, including bookmaking and its related manufactures, revealing rather complex and fluid transmissions. While it is possible to establish a philological lineage for some of the textual units (namely, the recipes) found in the treatises, the proliferation of *loci similes* across different traditions – and sometimes even within the same tradition – reflects multiple possible levels in the generation of variants. In certain cases, textual variants amount to mere reformulations of procedures or lexical updates; occasionally, however, they correspond to technical modifications in the procedures or ingredients, either as intentional updates introduced by knowledgeable scribes or compilers or, in other instances, as the result of simple palaeographical misreadings.⁵

The most ancient among these works is *Zīnat al-kataba* (*The Ornament of the Scribes*), by the renowned physician and alchemist Abū Bakr Muḥammad b. Za-

4 On Arabic sources on these different subjects, see Gacek 2004. On *adab* literature, see Gherseti 2020, with extensive bibliography.

5 Editions and translations of selected sources on inks are in Raggetti 2016; Raggetti 2019; Raggetti 2021a. A comprehensive study on the philological relations between the technical sources on inks and their literary dimension is in Fani 2020; Fani 2021; Fani 2023 (with Italian translation of the sources). From this point onwards, the recipes contained in the technical treatises presented below will be identified by an alphanumeric code corresponding to the initials of the author's name and the recipe number, as drawn from – or inferred on the basis of – the textual division found in the relevant critical editions. Where applicable, the code corresponds to that already adopted in Fani 2023. For the recipes concerning ink removal and their corresponding codes, see Appendix 1 in this chapter.

kariyyā' al-Rāzī (d. 313 AH / 925 CE), a brief treatise primarily addressing ink production (both black and sympathetic) as well as stain removal (from clothing and writing surfaces).⁶ The following century saw the compilation of *Umdat al-kuttāb wa-ʿuddat dawī al-albāb* (*The Staff of the Scribes and Implements of the Wise Men*) – attributed to the Zirid governor of the historical region of Ifrīqiyyā (modern-day Tunisia and its surrounding regions) al-Muʿizz Ibn Bādīs al-Tamīmī al-Ṣanhāgī (d. 454 AH / 1062 CE). This is a longer compilation of recipes that includes coloured and metallic inks along with procedures for papermaking and bookbinding.⁷ This served as the main source for another treatise, *al-Muḥtaraʾ fī funūn min al-ṣunaʾ* (*The Findings on the Techniques of Craftsmanship*), attributed to a different governor. In this case, the alleged author is the Rasulid sultan of Yemen, al-Muẓaffar Yūsuf b. ʿUmar al-Ġassānī (d. 694 AH / 1294 CE), who sourced most of the recipes for ink production directly from the Tunisian treatise, offering a local variant for paper production and adding sections on weapons and fabric treatments (dyeing and bleaching).⁸ A coeval source from the opposite side of the *Dār al-Islām* is the compilation of recipes *Tuḥaf al-ḥawāṣṣ fī ṭuraf al-ḥawāṣṣ* (*The Gifts of the Wise Men on the Curiosities of the Occult Properties of Substances*), by Abū Bakr Muḥammad b. Muḥammad al-Qalālūsī (d. 707 AH / 1308 CE), secretary (*kātib*) and poet at the Nasrid court of Granada, who basically covered the same sections.⁹ These works have been studied primarily for their sections on papermaking, bookbinding, and ink production. It is in the last section that the authors, across the various textual traditions, express concern for the durability of the writing on the support. This is identified as one of the essential qualities a good ink should possess, alongside its sheen and colour intensity, particularly in the case of black inks.¹⁰ The sources also recall the concern for durability by referring to the possible damage caused by an unbalanced mixture of ingredients in preparations of iron-gall inks, which could lead to the support oxidising and, in the worst cases, completely degrading.¹¹

However, different sources, both textual and material, reveal a variety of intentions and sometimes suggest that duration was not necessarily the most desirable objective. Different perspectives on the durability and preservation of writings could

6 Zaki 2011; al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011; Fani 2023, 61–75.

7 Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zaki 1971 (English translation in Levey 1962).

8 Al-Muẓaffar al-Ġassānī, *al-Muḥtaraʾ fī funūn*, ed. Ṣāliḥiyya 1989; Fani 2023, 76–116.

9 Al-Qalālūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-ʿAbbādi 2007; Fani 2023, 192–222.

10 See, for example, the recipe by Abū Bakr Muḥammad b. Zakariyyā' al-Rāzī for an ink 'that cannot be deleted and whose traces cannot be removed', transmitted also by later authors (al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 222–223, no. 6; Fani 2021, 123–130; Fani 2023, 66–67, R IV).

11 Fani 2023, 36–38.

be shaped by various factors, such as the cost or difficulty of obtaining resources, particularly writing materials like papyrus and parchment, which were expensive or scarce. This difference in priority is evident, for instance, in the admonitions attributed to Caliph 'Umar II (r. 99–101 AH / 717–720 CE), who urged the careful use of papyrus in administrative centres, as reported by the renowned secretary of the Mamluk chancery in Cairo, Aḥmad b. 'Alī al-Qalqaṣandī (756–821 AH / 1355–1418 CE).¹² Chanceries and administrations highly valued this material, as it was believed that writing inscribed on it could not be erased without leaving visible traces on the surface. Nonetheless, the caliphal administrations were not opposed to reusing papyri, a choice driven by material costs. This concern for economy is further corroborated by the common practice of filling the entire writing surface with inscriptions in every direction, added at different stages.¹³ Moreover, for centuries, a method was known in Egypt – one of the primary centres of production – for washing papyrus and restoring its original appearance by fading the traces of previous writings, thereby allowing it to be reused *ex novo*.¹⁴

Other evidence supports the need for ephemeral writing in specific contexts of use, such as the didactic one. The erasable wooden tablet (*lawḥ*, pl. *alwāḥ*) was indeed widely used across the Islamic world as a fundamental tool for teaching basic literacy in primary-level Qur'anic schools. During the learning process, the *lawḥ* often functions as a precursor to more permanent materials, such as parchment and paper: students write on it, memorise the content, and wash off the writing at lesson's end.¹⁵ While new forms of knowledge transmission have largely supplanted this pedagogical practice in most parts of the Islamic world, it continues to be widely employed in Sub-Saharan West Africa, as documented in Andrea Brigaglia's study,¹⁶ which highlights its initiatory function and its ritual dimension as a symbolic re-enactment of the Revelation itself.

In the thirteenth-century technical treatise compiled by the *kātib* al-Qalalūsī, one section refers to preparing clay crayons for teaching (*'al-ṭīn allādī yu'allamu bihi'*), which could be obtained either from single substances or by mixing different ones.¹⁷ According to the description, the products are made from powdered or

¹² Al-Qalqaṣandī, *Ṣubḥ al-a'šā*, 1914–1928, vol. 3, 49.

¹³ Déroche and Sagaria Rossi 2012, 41.

¹⁴ Rāḡib 1990, 22. For a study of this practice on Greek papyri dating from the third century BCE to the ninth century CE, see Schmidt 2009. On reusing papyrus as a palimpsest, see also Elena Hertel's contribution to the present volume.

¹⁵ Ware 2014, on the region of Senegambia.

¹⁶ Brigaglia 2017.

¹⁷ Al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-'Abbādī 2007, 37–38; the description of the clay crayon is included in a chapter dedicated to the wad (*liqa*) to be soaked in the inkwell, the sawdust used to

extracted pigments, mixed with melted gum arabic, and dried to form small disks or pastilles (*qaraṣa*). The ingredients are both mineral and vegetal – different types of ochre as well as plant-derived dyeing substances – which result in light-coloured pastes. Even though the source does not explicitly mention the surface on which the *qaraṣa* are intended to be used, it is quite clear that the recipes refer to preparing a kind of chalk or crayon for erasable writing, as this is the pedagogical intent explicitly mentioned in the procedure's title. These crayons could have easily been used by teachers on various surfaces – such as walls – and not necessarily on wooden tablets.

Erasable writing practices are also employed in rituals, during which specialists inscribe esoteric formulas, invocation and doxologies, or Qur'anic passages on 'talismanic' wooden tablets, or different supports, which are then washed off, and the resulting liquid consumed by the petitioner, thereby absorbing its power. These practices continue to be in use today across various regions of the Dār al-Islām, reflecting a persistent tradition that transcends time and geography.¹⁸ These practices clearly represent the entanglement between the oral and written dimensions of the Qur'anic message mentioned above, as well as the close connection to its material expression, which materialises not only in ritual contexts but also in other spheres of everyday life, such as the medical and social domains.¹⁹ The written sources tend to provide limited information regarding the materiality of these practices, such as the coating of the tablets, if any, or the type of ink used. However, this could be easily justified by the esoteric character of these rituals, which likely entailed a more selective path for their transmission. A singular reference to an ink that should not be fixed (*lā yaṭbutu*) on the wooden tablet (*lawḥ*) – possibly alluding to its use in ritual contexts – occurs in a brief section of the same al-Qalalūsī's treatise devoted to practical recommendations for scribes, ranging from insect deterrents to anti-fermentative agents for ink, and the most appropriate types of containers according to ink composition. This ink is produced by increasing the quantity of sugar (also mentioned in the same section as an anticoagulant), which would have likely enhanced its taste for the person imbibing it.²⁰

dry the ink, and certain preparations with which the handwriting is coated to preserve or enhance its appearance. See Appendix 3 in this chapter.

¹⁸ El-Tom 1985; Nieber 2024; on early debates over the ingestion of the Qur'an see Zadeh 2009, 461–466.

¹⁹ Nieber 2024, 53, n. 1.

²⁰ Al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-'Abbādī 2007, 26; see also Fani 2023, 207 (Q 1.22). For similar practices where different additives are mentioned see Coulon 2022, 238–239 (rosewater, orange blossom water), Zadeh 2009, 464 (saffron).

In the technical sources mentioned above, a specific class of ink is related to the idea of durability in a particular way. Among the category of sympathetic inks, which in the sources are defined through a periphrasis as a way to ‘enclose secrets into books’ (*‘taḍmīn/waḍ’ al-asrār fī al-kutub’*), most are intended to be visible only after a physicochemical treatment, for example, heating, or after interaction with specific substances. In this case, the concept of durability relates strictly to a different need, namely that of visibility *on demand*. A cluster of recipes related to this ink type appears to have enjoyed significant popularity in the Arabo-Islamic context, as traces of them – whether individual recipes or an entire set – can be found across a wide range of textual traditions pertaining to different fields. These include the aforementioned technical treatises (both codicological and more encyclopaedic in nature),²¹ among which the one compiled by al-Rāzī presents the earliest set of recipes, which appear with textual or procedural variants or both in contemporary and later sources. Among them is the manual for the *kuttāb* by Ibrāhīm b. Muḥammad al-Šaybānī (*fl.* ninth century CE), titled *al-Risālat al-‘aḍrā’* (*The Virgin Epistle*), dating from the second half of the ninth century CE,²² and the almost contemporary *adab* work *al-‘Iqd al-farīd* (*The Unique Necklace*), by the Cordovan Aḥmad b. Muḥammad Ibn ‘Abd Rabbih (246–328 AH / 860–940 CE), which presents a selection from al-Rāzī’s recipes after quotations from the lexicographer and philologist Abū Ḥatīm Sahl al-Siġistānī (d. 248 AH / 869 CE).²³ The same procedures, sometimes accompanied by more extravagant ones, are also found beyond manuals on craftsmanship and chancery, in unexpected literary genres, such as works produced by street entertainers and charlatans. These include the compilation of instructions for entertaining and amazing the public *al-Ḥiyal al-bābiliyya li-l-ḥizāna al-kāmilīyya* (*The Babylonian Stratagems for al-Kāmil’s Treasure*) by the courtier at the Ayyubid court al-Ḥasan b. Muḥammad al-Iskandarī al-Qurašī (*fl.* 640 AH / 1243 CE), a courtier at the Ayyubid court; *‘Uyūn al-ḥaqā’iq wa-īdāḥ al-ṭarā’iq* (*The Best of True Facts and the Explanations of Their Ways*) by the alchemist Abū al-Qāsim b. Aḥmad b. Muḥammad al-‘Irāqī (*fl.* thirteenth century CE); and *Zahr al-basātīn fī ‘ilm al-mašātīn* (*The Garden’s Flowers on the Knowledge*

21 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 225 (nos 25–30), 226–227 (nos 40, 42–44); Ibn Bādīs, *‘Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zakī 1971, 135–137; al-Muẓaffar al-Ġassānī, *al-Muḥṭara’ fī funūn*, ed. Šālīḥiyya 1989, 93–94; al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-Abbādi 2007, 36; see also Fani 2023, 71–72 (R XIX–XXIII), 74–75 (R XXX, XXXII–XXXIV), 109–110 (MM V.1–4), 217–218 (Q VII.1–5); Levey 1962, 35b–36a.

22 Ibn al-Mudabbir, *al-Risālat al-‘aḍrā’*, ed. Mubārak 1931, 28–29. Note that the work is erroneously attributed by its editor to its dedicatee.

23 Ibn ‘Abd Rabbih, *al-‘Iqd al-farīd*, ed. al-‘Aryān 1953, 242. The recipes are also quoted in al-Siġistānī’s biography reported in Ibn Khallikān, *Wafayāt al-a’yān*, ed. ‘Abbās 1968–1977, vol. 2, 432.

of *Sleight-of-Hand*) by Muḥammad b. Abī Bakr al-Zarḥūrī al-Miṣrī (fl. fifteenth century CE), a performer and illusionist.²⁴ In these contexts, the recipes' intended use diverges from the *adab*'s educational objectives in the field of diplomacy and chancery, entailing a more spectacular and captivating purpose. The entire set of recipes in al-Rāzī's compilation as well as the later ones includes various types of sympathetic writing: with milk, which becomes visible on papyrus upon contact with hot ash; with vitriol, which appears in contact with gallnut extract or vice versa (the reaction at the basis of iron-gall inks, but in two steps); with softened gum ammoniac or incense on papyrus, parchment, or paper, which becomes visible upon contact with ash or after fumigation with incense or bran; with dissolved ammonium salt, visible after incense fumigation; and with onion juice, revealed after fumigation with a lamp. It also covers writing visible at night, but not by day, made with the bile of a turtle or of a specific type of fish (*nuṭāb*); one visible only while the carbon-based ink (*midād*), mixed with pigeon blood, remains wet; and another type with the same effect, made from the burned fruit of colocynth. In *al-Iqd al-farīd*, Abū Ḥatīm al-Siġistānī describes to the author 'sublime things (*ašyā' ḡalīla*) for changing [the aspect] of the letters, which are achievable by everyone'.²⁵ Among these, one of the recipes he mentions features a significant variant compared to the same procedure reported in other sources: the description of iron-gall ink made in two steps does not mention gallnuts. Instead, the effect, if any, relies on the reaction between the solution of 'white vitriol' with 'vitriol'. This variant is likely due to an error in the transmission, caused by the specular phrasing (homeoteleuton) of the original textual unit, in which the procedure is also presented with the ingredients inverted.²⁶

For all these recipes, it is possible to imagine various contexts of use, such as diplomatic or private secret epistolary exchanges, as suggested by the title of the

24 Al-Iskandarī, *al-Ḥiyal al-bābilyya*, ed. Qārī 2018, 173–184; al-Zarḥūrī, *Zahr al-basātin*, ed. al-Qārī 2012, 137–142 (nos 111–124); see also Raggetti 2021b, 160–161 (§ 6.1.6), 165–168 (§§ 6.3.1–14). An edition and translation of this section of al-ʿIrāqī's *ʿUyūn al-ḥaqāʾiq* is in Raggetti 2021a, 178–182 and Raggetti 2021b, 163–164 (§§ 6.2.1–8).

25 Ibn ʿAbd Rabbih, *al-Iqd al-farīd*, ed. al-ʿAryān 1953, 242.

26 As a matter of fact, the black precipitate, namely the ink, is more easily – though not exclusively – obtained with iron sulphate, which the sources commonly refer to as 'green vitriol' due to the colour of its crystals and its solution, both of which turn yellow upon oxidation. The reference to the colour 'white' should likely be understood here as the transparency of the green vitriol solution, which should not be visible on the writing surface. Indeed, in the inverted version of the recipe, the colour is not specified. The recipe is translated in Pedersen 1984, 68, with no reference to the error.

textual section and, in a few cases, within the lines of the procedures.²⁷ Moreover, they all share the production of marvellous and astounding effects – or promise as much – particularly in contexts where the underlying chemical or physical principles are not explicitly conceptualised, despite being empirically observed and exploited. This, as mentioned above, made these procedures ideal material to include in textual compilations of tricks, deceptions, and astonishing effects.²⁸

3 Stability in the textual transmission

As for the concept of stability of the text – that is, its adherence to a reference model and the modifications it undergoes during the various stages of its transmission – authors since the earliest centuries of Islam have approached the issue from two distinct perspectives. Each perspective broadly aligns with a specific field of textual production, with different codicological outcomes:

(1) In the first case, the modification and cancellation of the writing remain visible: a practice that can be defined as *transparent*, typically described in *adab* manuals on chancery for compiling documents and texts.

(2) In the other case, the modifications – or at least the original layers of writing – are hidden: a practice that can be defined as *non-transparent*, primarily described in technical manuals.²⁹

The first case is mainly mentioned by authors who developed what could be considered a primitive or archaic philological approach, even though limited to the *collatio*, which started to be adopted with the first compilations of *ḥadīṭ* collec-

27 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 225; al-Muẓaffar al-Ġassānī, *al-Muḥṭaraʿ fī funūn*, ed. Ṣāliḥiyya 1989, 93; see also Fani 2023, 71–72 (R XX), 110 (MM V.3). Ibn ʿAbd Rabbih, *al-Iqd al-farīd*, ed. al-ʿAryān 1953, 242: recipe for the iron-gall ink in two steps, in which the reaction to make the writing visible has to be triggered once the message has been delivered (*ʿidā waṣāla ilā al-maktūb ilayhī*).

28 But see also the explicit aim to amaze (*ʿin aradta an tuḡriba ʿalā aḥad*) expressed for one of the same recipes in the work of the *kātib* al-Qalālūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-ʿAbbādī 2007, 36; see also Fani 2023, 217 (Q VII.2).

29 Certainly, these two different practices should not be regarded as exclusive to the two groups of actors mentioned in their respective descriptions, nor should it be assumed that these groups cannot equally make use of both practices, even within the same manuscript. Moreover, the two professions could certainly overlap. However, these practices can be seen as broad definitions that encompass the different approaches involved in modifying texts throughout the various stages of their production, transmission, and use.

tions, and *fiqh* ('jurisprudence') manuals.³⁰ This approach materialised and manifested in the manuscripts' folios and was later codified in administrative manuals or chancery manuals, especially those produced during the Mamluk age. This textual genre offers a wealth of information on writing, writing implements, calligraphy, and paper formats. The most comprehensive chapter concerning the modification, or copying and correction of manuscript texts, and in particular *ḥadīṭ* compilations, is transmitted by Badr al-Dīn Muḥammad b. Muḥammad al-Ġazzī (d. 984 AH / 1577 CE) in his manual, *al-Durr al-naḍīd fī ādāb al-muḥīd wa-l-mustaḥīd* (*The String of Pearls in the Etiquette of the Teacher and the Learner*),³¹ which was abridged by his contemporary 'Abd al-Bāsiṭ b. Mūsā al-'Almawī (d. 981 AH / 1573 CE).³² According to this work, the correction process (*taṣḥīḥ*, *iṣlāḥ*) involves the visible registration of textual variants, based on a comparison with other copies (*mu'āraḍa*, *muqābala*, *mubālaḡa*; namely, 'collation') or on the basis of the recitation or audition (*qira'a*, *samā'*) of the text in the presence of an authority witness to the transmission process, who could sometimes be the author himself.³³ Non-conformity with the reference model – that is, the presence of scribal errors or different *lectiones* – had to be annotated with a specific repertoire of marks and abbreviations, described using a specialised terminology, such as *tahriḥ* and *al-taqdīm wa-l-taḥīr* (metathesis); *saqṭa*, *naqṣ*, *tahriḡ*, and *laḥaq* (omissions); *ziyāda* (addition); *taṣḥīf* (errors resulting from incorrect letter-pointing or vocalisation);

30 In addition to the Arabic sources specifically addressing these genres (Gacek 1989; Gacek 2007; Rosenthal 1947), other studies draw on evidence observed in various manuscript traditions. For example, Florian Sobieroj offers an analysis of the textual variance of Arabic didactic poems compiled between the eleventh and the seventeenth centuries CE, attempting to categorise variance in this specific literary genre, and provides an excursus of the means of text stabilisation (Sobieroj 2016, 11–52). For a discussion on the variance of the Qur'anic text, see Small 2011.

31 Al-Ġazzī, *al-Durr al-naḍīd*, ed. al-Miṣrī 2006; Gacek 1989. Along with his study and translation, Gacek published the images of a manuscript witness that was collated in the presence of the author himself (plates XXb–XXXIb).

32 Al-'Almawī, *al-Mu'īd fī adab al-muḥīd*, ed. al-'Aṭiyya 2004. A translation and discussion of the relevant chapter is in Rosenthal 1947, 7–18. Franz Rosenthal specifies that there is another work, composed by Muḥammad b. Ibrāhīm Ibn Ġamā'a in 672 AH / 1273 CE, *Taḍkirat al-sāmī' wa-l-mutakallim fī adab al-'ālim wa-l-muṭ'allim*, which is almost identical to al-'Almawī's work. Only Ibn Ġamā'a cites as a source a work by al-Ḥaṭīb al-Baġdādī (392–463 AH / 1002–1071 CE), now lost, which may have been the common source for both. For the relevant translation of Ibn Ġamā'a's work see Canova 2012, 240–249.

33 *Stricto sensu*, the word *muqābala* is not exactly synonymous with *mu'āraḍa*, as it does not necessarily entail an audition in the presence of an *auctoritas* ('*al-qirā'a 'alā al-ṣayḥ*'); rather, it can rely solely on another copy (or copies) of the text (Gacek 1989, 56, n. 52; see also Gacek 2009, s.vv. 'Collation', 'Collation notes and marks').

and *bayān* (restoring a cacographic error). Likewise, the textual passages to be deleted or substituted (*ḍarb*, ‘cancellation’; *badal*, ‘substitution’) had to be marked. All of this remains visible on the manuscripts, attesting to the reliability of the copy, underpinned by this work of variant sifting.³⁴

In general, the sources that address the technicalities of knowledge transmission dissuade copyists from using alternative methods of erasure and deletion, arguing that what was erased may turn out to be correct in another recension.³⁵ Nonetheless, the authors describe some of these methods for deleting superfluous words as:

- *kaṣṭ* (‘erasing’), *baṣr* (‘scraping’), or *ḥakk* (‘rubbing’) with a penknife, preferable only for very small portions, such as diacritical dots or vowels; and
- *maḥū*, namely the ‘deletion’ or ‘taking off’ of the ink by other means, such as a cloth eraser (*ḥirqa*) or by licking off still moist ink from the writing surface.³⁶

In the Arabo-Islamic milieu, references to such practices for obliterating writing from the page also can be found in sources of different kinds as mere incidental information. Take, for example, the *Kitāb al-Tanbīh wa al-iṣrāf* (*The Book of Notification and Verification*) by the tenth-century historian and geographer Abū al-Ḥasan ‘Alī b. al-Ḥusayn al-Mas‘ūdī (283–346 AH / 896–957 CE): in his description of the Mount Etna eruption, he mentions the floating, white, and light stone, which he describes as the material used to scrape writing from paper and parchment (*‘yuhakku bihi al-kitāba min al-dafātir wa-l-ruqūq wa-ḡayr dālik’*), which can be easily identified as pumice (in the text, *qaysūrā* or *f*n*s*k*).³⁷

³⁴ The specific terminology and marks of the transmission and correction processes are detailed in Rosenthal 1947, 7–18; Gacek 1989; Gacek 2007; Gacek 2009, s.vv. ‘Scribal errors’, ‘Cacography’, ‘Metathesis’, ‘Omissions and insertions’, ‘Textual corrections’, ‘Cancellation’; Canova 2012, 247.

³⁵ Canova 2012, 249. Moreover, the word *ṣaḥḥa* (‘to be correct’) can be added to the text to restore its original version when a deletion or substitution is mistakenly made (Gacek 1989, 57; Gacek 2007, 225–227; Gacek 2009, s.v. ‘Cancellation’; Canova 2012, 248).

³⁶ The last should have been quite a common practice, according to the saying attributed to Ibrāhīm al-Naḥa‘ī (d. 96 AH / 714 CE) and quoted by al-Ġazzī: ‘One of the traits of manliness is the ink on a man’s clothes and lips’ (Gacek 1989, 58–59). Such indications, especially related to carbon-based ink, are well attested in Latin sources as well. In first-century BCE Spain, for example, Martial provided instructions for the removal of carbon-based ink from writing supports with a sponge, which sometimes occurred even with rain alone. A century later, Suetonius wrote that the operation could also be performed with the tongue. In this regard, the reflections of Mūsā Ibn Maymūn (known in the West as Maimonides, twelfth century) are also interesting: he addresses the issue of using such inks in liturgical writings, where a certain durability over time was required (Zerdoun Bat-Yehouda 1983, 85–86, 111–116).

³⁷ Al-Mas‘ūdī, *al-Tanbīh wa-l-iṣrāf*, ed. al-Ṣawī 1938, 53.

Many other methods for completely deleting or effacing writing from different supports, through mechanical or chemical actions or both, are transmitted by the aforementioned technical manuals on bookmaking. I will focus on them in a moment, after further elaborating the occurrences of these practices, based on material evidence that can be contextualised according to two motivational frameworks. Some cases of adjustment were driven by the intention of the scribe who compiled or copied a text, or by a reader who obtained a copy accomplished by someone else, to conform to a reference model (textual, auditory, or mental). This was a way to rectify his own, or someone else's, involuntary scribal errors (or presumed errors), by concealing them and, when possible, rewriting on the same portion of the support. This situation mirrors the ones described by al-Ġazzī, but with a final different choice, namely, deleting the previous writing on the support and, in some cases, replacing it with a different inscription considered the correct one, or the better choice. Other cases of complete deletion could also be motivated by doctrinal, ideological, linguistic, and even deceitful intents. The existence of very early Qur'anic palimpsests, for example, can be understood in the context of a normative action promoted by religious authorities, aimed at the destruction of all non-orthodox variants of the sacred text, as evoked in the aforementioned tradition.³⁸ Their production is well attested by material evidence, and the spread of this practice related to the canonisation of the Qur'an is recorded in early and authoritative sources, such as the *Kitāb al-Fihrist*, the famous compendium of the knowledge and literature of tenth-century Islam compiled by the bibliographer Ibn al-Nadīm (d. c. 385 AH / 998 CE), who stated:

I saw a certain number of Qur'anic codices (*muṣḥaf*), that the copyists remember as Ibn Mas'ūd's codices. It is not possible to find two identical copies among them, and most of them were copied on rewritten parchment (*wa-aktaruḥā fī raqq kaṭīr al-nusah*).³⁹

³⁸ Qur'anic palimpsests on parchment are primarily studied by codicologists, palaeographers, and philologists to recover the inferior, often invisible, layers of the text and examine their relationship with the superior layer. They are crucial documents in the history of the transmission of the Qur'anic text, and their significance often leads to intense debate. Notable examples include the famous Ṣan'ā' Palimpsest (Sadeghi and Goudarzi 2012; Hilali 2017; Cellard 2021) and the more recently identified Birmingham Palimpsest from the Mingana collection (University of Birmingham, Cadbury Research Library, Islamic Arabic 1572a – parchment dated by radiocarbon c. 568–645 CE), which is still awaiting comprehensive investigation. See the related 'Mingana-Lewis Palimpsest' project: <<https://www.lib.cam.ac.uk/research/digital-humanities/case-studies/mingana-lewis-palimpsest-project>>, accessed on 13 January 2025.

³⁹ Ibn al-Nadīm, *Kitāb al-Fihrist*, ed. Flügel 1871–1872, vol. 1, 26.

These two mentioned practices differentiate in the aim of either conforming to or deviating from a model, but they are similar in the intention to obliterate what was originally written on the page. As previously mentioned, these interventions could be carried out by the copyist of the manuscript or by other actors involved in the history of the codex, such as owners, occasional readers, and others. The varying degree of involvement of such individuals in a manuscript's history is reflected in their erasing actions, which can affect the main text (*matn*) itself and its *textual filiations* – whether interlinear or in the margins – such as comments, glosses, and scholia of any kind (*ḥāšiya*, *šarḥ*, *tafsīr*), as well as any paratextual elements related to the specific copy, including colophons, dedications, ownership statements, reading notes, and the like.

4 Technical procedures for ink removal from writing supports

The recipes detailing ink removal procedures have long been neglected, much like most of the literature in which they are found, namely, technical manuals on bookmaking, at least until recent years.

Before delving into a detailed analysis of some of the recipes, an overview of the possible categories of the procedures described will be useful, highlighting the aspects that differentiate them. The features and intended uses of the final products are in some cases explicitly indicated in the title of each textual unit; in others, they can be inferred from the procedural content itself. Taken together, titles and descriptive sections provide information regarding:

- the overarching purpose of the procedure, often expressed through verbs such as *maḥū* ('deletion, erasure'), *qal'* ('removal, weed out'), and *azāla* ('to make disappear, to remove'), as well as more specific verbs related to the type of intervention;
- the type of ink to be removed – either *midād* ('carbon-based ink') or *ḥibr* ('iron-gall ink') – although some recipes refer more broadly to *al-kitāba* ('the writing');

- the writing support to be treated, which may include papyrus (*qirtās*), parchment (*raqq*, *daftar*, *muṣḥaf*), paper (*kāḡad*), or, in one case, leather (*ḡild*);⁴⁰
- the extent of the treated surface, ranging from small sections (intended, for instance, to correct mistakes – *ḥaṭa*, vowels marks, or diacritics) to the complete erasure of the surface (as in the case of palimpsests – *ṭirs*);
- the nature of the intervention itself, whether mechanical (generally employed for localised erasure) or chemical. These interventions could be implemented through a variety of methods, as reflected both in the diversity of verbs employed and in the range of substances used:
 - a sticky substance – such as wax, incense, or other gum resins – made into a paste (*aḡana*), then shaped into small portions (*ballūt*, ‘acorns’; *qaraṣ*, ‘pastilles’; *bunduq*, ‘hazelnuts’; *fatīla*, ‘wick’) and dried out (*ḡaffa*) to collect the ink by sticking it (*laqaṭa*);
 - a whitish plaster to cover the ink (*talā*, *lāṭa*);
 - an abrasive substance to rub or scrape off (*ḥakka*, ‘araka, qaššara’) or a vegetal sponge (*līfa*) or a wool cloth (*ṣūfa*) to wipe off (*masaḥa*) the ink;
 - a liquid substance to wash off the ink (*ḡasala*);
 - a liquid substance to be sprinkled on the writing surface (*ḍarra*), completing the procedure with an abrasive substance.

4.1 Sticky substances for papyrus

As for the writing supports to be treated, it is interesting to note how the sources trace the codicological development of Arabic manuscript production, particularly the shift from one writing support to another.⁴¹ Papyrus (*qirtās*), in fact, is only mentioned in the oldest compilation of recipes that included this genre of procedures, namely al-Rāzī’s *Zīnat al-kataba*.⁴²

[R X] – Deletion of writing (*maḥū*) from the [sheets of] papyrus (*qarāṭis*) so that it will not be visible. Glean (*laqaṭa*) it [by sticking it] with wax or chewed frankincense (*kundūr*) or olibanum (*lubān*), or with pounded gum ammoniac. Drop a drop of water on it and grad-

⁴⁰ These terms, notwithstanding their polysemy, are not the only ones used to refer to these writing supports; however, the others, such as *waraq* (‘paper’) and *bardī* (‘papyrus’), do not appear in the recipes for ink removal (Gacek 2001, s.vv.; Gacek 2008, s.vv.).

⁴¹ For an overview on the subject, see Déroche and Sagaria Rossi 2012, 39–72.

⁴² On the specific definition of the different writing supports by al-Rāzī, see Fani 2023, 237–238.

ually pick up [the ink]; each time you pick up a bit of it, check the other side. [The writing deletion] will not be visible.⁴³

[R XXVIII] – [Removing using a] plaster (*lawṭ*) the *midād* from the [sheets of] papyrus (*qarāṭis*). Take some wax, soften it, and apply it generously over the writing on the [sheets of] papyrus.⁴⁴

Although the two recipes seem quite similar in terms of ingredients, all characterised by their sticky nature, they seem to describe two different methods of ink deletion. In the first, the ink is literally picked off the writing surface, while, in the second, it is only covered or plastered over. On the other hand, the preposition *min* ('from') in the latter's title suggests that the removal of the writing medium from the support is also implied in the second method. This aspect, combined with the sticky substance as the main ingredient, indicates that both procedures aim at removing the medium by sticking to and pulling it off, and not only at covering it with a plaster; indeed, the carbon-based ink can be more easily removed from a less porous support, such as papyrus, as it does not penetrate the fibres.⁴⁵ The difference between the two procedures can thus be identified in the more focused and delicate action of the first (*qalīlan, šay'an min*) and the stronger action of the second, as suggested by the verb 'to apply generously over' (*ḡamura*) with reference to the plastering. From this perspective, it is likely that the recipe omits the final step, which would involve detaching the wax from the papyrus, 'picking up' or 'sticking off' the ink from the support, but in a single motion. Another possible interpretation is that the procedure does not include reusing or rewriting on the surface (which would not be feasible upon a wax plaster) but more simply covers and conceals the writing. The yellowish colour of the wax would have resembled the paper colour, thereby enhancing the camouflaging effect. In any case, the verb *laqaṭa* ('to glean, to pick up') and *lāṭa* ('to plaster, to coat'), along with its verbal name *lawṭ*, both referring to the ink or writing, are paleographically quite similar in Arabic script; this resemblance may have led to a textual variant during transmission, potentially accounting for the conflation or ambiguity in the technical distinction between the two procedures. A later Andalusian version of this recipe, which adds gum arabic to the wax, is presented by al-Qalālūsī (Q XI.5) and is more explicit about applying the preparation – specifically, to stick the ink off, in this

43 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 224 (no. 15); see also Fani 2023, 68–69.

44 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 226 (no. 38); see also Fani 2023, 74.

45 See Section 5 of Colini et al.'s contribution to the present volume.

case from paper (*kāḡad*).⁴⁶ The first-mentioned recipe, by al-Rāzī (R X), was also repropounded in later compilations, where its procedural description appears with minor textual variants; in these versions, the writing support to be treated is also changed.⁴⁷

4.2 Palimpsests

Some older technical sources report procedures for writing erasure. One such procedure for the complete removal of iron-gall ink (*ḥibr*) from leather and parchment (*al-ḡulūd wa-l-maṣāḥif*)⁴⁸ involves washing these writing supports with the juice of oleander (*diflā*) leaves and barley grains. This method is included in the short treatise on stain removal, titled *Ta'liq fī qal' al-āṭār min al-ṭiyāb* (*Remarks on Stain Removal from Clothes*) attributed – though likely spuriously – to Iṣḥāq Ibn Ḥunayn (d. 297 AH / 910 CE), son of the famous physician Ḥunayn Ibn Iṣḥāq, both renowned for their translations of scientific works during the Abbasid Period.⁴⁹

⁴⁶ In this case, a direct descent from al-Rāzī's text is not certain, given the addition of an ingredient (*ṣamaḡ*, 'gum'), a procedural step (the making of small filaments), and a different lexical choice (*mūm* instead of *ṣam'* for 'wax'). However, it should be noted that on other occasions the Andalusian author explicitly sources from the collection of recipes transmitted under al-Rāzī's name (Fani 2023, 240; see also n. 52 below).

⁴⁷ Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zakī 1971, 139 (IB IX.7), where the procedure is meant to remove iron-gall ink from paper (*kāḡad*); al-Muzaḡffar al-Ḡassānī, *al-Muḥṭara' fī funūn*, ed. Ṣāliḥiyya 1989, 96 (MM V.11), where the treatment is referred to parchment ('*min al-dafātir wa-l-ruḡūq*'), as mentioned in the previous recipe (MM V.10); see also Fani 2023, 112. The only later source that quotes the same recipe, maintaining the reference to papyrus, is al-Iskandari: al-Iskandari, *al-Ḥiyal al-bābiliyya*, ed. Qārī 2018, 181 (no. 209); see also Raggetti 2021b, 161 (§ 6.1.7[a]).

⁴⁸ The polysemy of the term *muṣḥaf* (pl. *maṣāḥif*) refers both to individual sheets of parchment and to entire codices, particularly Qur'anic codices bound as a single volume, made of parchment (Gacek 2001, s.v. 'Muṣḥaf'). Regarding the juxtaposition of leather and parchment in this recipe, it is interesting to note that their preliminary treatments result in different chemical properties for the two supports. Leather typically becomes acidic due to the tanning agents, while parchment is generally alkaline because of the lime used in its production. Therefore, the two agents mentioned in the recipe – oleander juice and barley grains – would likely interact differently with these two types of writing supports, influencing the efficacy of the erasure process.

⁴⁹ GAL S, vol. 1, 369. The text in question is known in three witnesses and largely reproduces the work *Risāla fī qal' al-āṭār* (*Short Treatise on Stain Removal*) compiled by Ya'qūb Ibn Iṣḥāq al-Kindī (d. c. 256 AH / 870 CE). Giuseppe Celentano edited the *Ta'liq fī qal' al-āṭār* as an appendix to the edition and translation of al-Kindī's work, which does not report any recipe for ink deletion from writing supports (Celentano 1985, 191–197).

[IH 4] – Washing off (*ġasl*) the *ḥibr* from leathers and parchments: take fresh oleander leaves and squeeze out their abundant juice, along with barley grains in one half of its amount; then lade it with some water in the same amount and wash the sheets with it. Then place them between two tablets, with some sand underneath until they dry out.

A similar version of this recipe is found in *Zīnat al-kataba* by al-Rāzī. In this method, the parchment sheets are soaked and stacked atop one another for a day and a night. Afterwards, their surfaces are rubbed with a vegetal sponge (*lifā*), and finally the parchments are stacked again after being sprinkled with barley flour.⁵⁰ Indeed, it is noteworthy that the title of this procedure, as well as of Ibn Ḥunayn's recipe, refers to the action of 'washing off' the ink, but in the case of al-Rāzī's work, the more specific term *ṭurūs* ('palimpsests'; sing. *ṭirs*) is used, possibly due to the more professional orientation of al-Rāzī's work towards the class of secretaries and scribes and the context of the book arts. In al-Rāzī's *Zīnat al-kataba*, there are indeed three additional recipes concerning the washing off (*ġasala*) of iron-gall ink (*ḥibr*) from sheets or quires of parchment (*dafātir*), which are not transmitted by later sources:

[R XXVIa] – Washing off the *ḥibr* from the [sheets of] parchment and the clothes. Wash [the parchment] with the sour juice of the citron, or, if you wish, with some white alkali (*qalī*),⁵¹ pouring some citron juice on it, until it softens; with this preparation rub the spot where the writing is placed until it starts [to fade]; then rub it with a *lifā* and the parchment will turn out white. [...]

[R XXVIc] – You can also wash it with vinegar, potash (*uṣṣān*), and citron juice.

[R XXXI] – Removal of the *ḥibr* from the [sheets of] parchment. Wash them with whey and, if you wish, with a solution of alkali.⁵²

⁵⁰ Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 226b (no. 37); see also Fani 2023, 74 (R XXVII).

⁵¹ The name indicates an alkaline soluble substance obtained from calcinated ashes of different halophilic plants. I prefer to give here the English translation, as it refers directly to one of the original sources, namely *Salsola kali*, L. (another notable plant for the purpose was *Salsola soda*, L.). The resulting product of the calcination is primarily a mixture of sodium carbonate and potassium carbonate, and it cannot be excluded that the two terms were used interchangeably, even within the same sources.

⁵² Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 226a–b (nos 33, 35, 41); see also Fani 2023, 73–75. The only exception regarding the later transmission is, also in this case, al-Qalālūsī (Q XI.4b), who merges the two recipes, mentioning the same procedure of R XXVIc but substituting the potash (*uṣṣān*) with a different alkaline substance, namely the white alkali mentioned in R XXVIa (al-Qalālūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-'Abbādī 2007, 41; see also Fani 2023, 221). Compare with n. 51 above.

Regarding palimpsests, *Firdaws al-ḥikma* (*The Paradise of Wisdom*) stands out for its antiquity and the originality of the ink-removal method it describes. This exceptional medical encyclopaedia by ‘Alī ibn Sahl Rabbān al-Ṭabarī (c. 838–870 CE), mentor of al-Rāzī, outlines a procedure within a chapter devoted to the properties of plants that interact with each other and erase one another’s traces.⁵³

[ṬB 1] – If you want to delete the [quires of] parchment (*dafātir*) inscribed with *ḥibr*, delete it using the [spare] heavy parts of safflower (*‘usfur*) that dyers throw away, or with chard (*salq*) cooking water.⁵⁴

The eleventh-century treatise on book-production crafts ascribed to Ibn Bādīs offers a unique procedure for palimpsests too:

[IB IX.4] – Another description. Dampen the parchment with water, then scatter lime (*kils*) over it, without stinting, and rub: this will eliminate the writing from the surface. If some [traces] of it remain, soak the parchment in wheat bran (*nuḥāla qamḥ*), salt, and water for two days or three: it will be cleaned and cleansed.⁵⁵

The recipe is not mentioned by the later sources, not even by the Yemeni treatise ascribed to al-Muẓaffar al-Ġassānī, who draws from the former for most of the other procedures, as with, for example, another recipe (MM V.6 ≈ IB IX.6) for iron-gall ink removal (*izāla*) from parchment that involves rubbing a paste of salt with a woollen cloth (*ṣūfa*) soaked in milk (*laban ḥalīb*) onto the writing.⁵⁶

⁵³ For an excursus of its content and its importance for the transmission of indirect traditions, see Raggetti 2020.

⁵⁴ The same recipe is included in al-Qalalūsī’s work (Q XI.4a), where the recipe shows a variant: *nuḥāla*, namely the ‘bran’ or ‘spear part’ of the safflower, instead of *itqāl* or *atqāl* (‘heavy part’ or ‘weights’), as it appears in the edition of *Firdaws al-ḥikma*. The Andalusian *locus similis* could doubtfully be the result of a palaeographical misreading and a *lectio faciliior*; nonetheless, if this was the case, the meaning would not be far from the *lectio difficilior*, the ‘spear part’ also being the one that mostly contributes to the ingredient’s weight (al-Ṭabarī, *Firdaws al-ḥikma*, ed. al-Ṣiddīqī 1928, 531; al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-‘Abbādī 2007, 41; see also Fani 2023, 221).

⁵⁵ Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zākī 1971, 139. This recipe is not included in Martin Levey’s translation or in another edition of the same work (cf. Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Harawī and Makkiyya 1989).

⁵⁶ The same recipe is also preserved in al-Qalalūsī’s treatise (Q XI.3); Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zākī 1971, 139; al-Muẓaffar al-Ġassānī, *al-Muḥtara‘ fī funūn*, ed. Ṣāliḥiyya 1989, 94; al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-‘Abbādī 2007, 41; see also Levey 1962, 37a; Fani 2023, 111, 220–221.

4.3 Erasing small portions of writing

Another of Ibn Bādīs's recipes (IB IX.3) is dedicated to removing iron-gall ink from a limited portion of parchment, rather than the entire sheet. This procedure, too, is unique to this work and is paired with another in the same treatise (IB IX.9), both employing the same treatment and application of the ingredients.⁵⁷ The first (IB IX.3) refers to the distillation (*taṣṭīd*) of lye (*mā' al-ġāsūl*) mixed with vinegar, or the distillation of onion juice (*mā' al-'unṣal*), as an alternative to soap water (*mā' al-ṣābūn*): the preparation must be applied over the writing to make it disappear. The second (IB IX.9) is for parchment and paper: one *raṭl* of *sabḥī* or *An-darānī* salt⁵⁸ is mixed with two *dirham* of water and distilled seven times; the result will be a white solution that must be applied over the inscription with the *qalam* (reed pen) to efface the ink. The recipes' more complex procedural passage – that is, distilling the ingredients – as compared to the other preparations is possibly the reason why they do not appear in later traditions. In fact, surprisingly, this practice is not even mentioned in al-Rāzī's treatise, where one would more naturally expect it to appear, him being an authority in the field of alchemy. This should not be necessarily read as a personal competence of the governor Ibn Bādīs: rather, it could be more easily explained by the marked compilatory nature of the treatise attributed to him, and by the fact that he, or whoever compiled it for him, could have accessed sources of different genres, including those more related to alchemy, possibly even in the very library of the governor.⁵⁹

4.4 The dark side of erasure

A common feature usually mentioned in the recipes is the discreet nature of the intervention: its invisibility on the writing surface. This requirement certainly could be informed by the scribe's aesthetic concerns, but, as mentioned above, in some cases it is possible to perceive intentions of a different kind. The ability to conceal alterations made to the writing surface is, in fact, fundamental to the use of sympathetic inks, which thus acquire a spectacular and astonishing dimension. However, this very characteristic can also serve less noble purposes, finding its

⁵⁷ Ibn Bādīs, *Umdat al-kuttāb*, ed. al-Ḥalwaḡī and Zakī 1971, 138, 140; translated with a few inaccuracies in Levey 1962, 36b, 37a.

⁵⁸ The first is salt in paste form, while the second refers to a crystalline salt, named after a town near Aleppo, possibly al-Andarīn, or Androna as it was known in Byzantine times (Ibn al-Bayṭār 1877, nos 2164, 2168).

⁵⁹ On the attribution of the treatise, see Fani 2023, 78–79.

raison d'être in secrecy and concealment, with deception as its ultimate goal. Among these practices, which are included in the same treatises, one can count, for example, a method for reading sealed documents without breaking the seals and a technique for making papyrus appear aged.⁶⁰ This particular dimension led to these very recipes being included in works dedicated to entertainment and deception, such as the aforementioned *al-Ḥiyal al-bābiliyya* by al-Iskandarī and *Zahr al-basātīn fī 'ilm al-mašātīn* by al-Zarḥūrī.⁶¹ A peculiar source is represented by the guide to unveiling frauds and tricks perpetrated by the so-called Banū Sāsān – the tribe, or, better, the guild, with which these popular tricksters are identified – or by other social groups: *al-Muḥtār fī kašf al-asrār* (*Anthology on the Unveiling of Secrets*) by the Damascene 'Abd al-Raḥīm b. 'Umar b. Abī Bakr Ḡamal al-Dīn al-Ġawbarī (thirteenth century CE).⁶² This work provides a clearly delineated bureaucratic context in which technical strategies were employed to forge notarial documents. Among the procedures described is the selective erasure of legal terms and substantive content, while deliberately preserving the signatures of the witnesses, thereby maintaining the appearance of authenticity:

[ĠB XXII.2] – To do this, they take one part amber (*kārubā*), one part starch (*nišā'*), one part galbanum granules (*ḥubb al-qinna*), one part castor seed (*ḥubb al-ḥirwa'*), and one part cottonseeds (*ḥubb al-quṭn*). They fumigate the document with this, the writing is erased, and they write whatever they want.⁶³

[ĠB XXII.3] – Another example: they take one part each amber and basil seeds (*ḥubb al-bāḍarūḡ*), pound the whole together, fumigate the document with it, and none of the writing is left. Wise up to these things!⁶⁴

These two examples – the first procedures presented by the author – are quite original recipes, both for the ingredients employed and for the peculiar lexical choices as compared with the other sources.

60 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 225, 226; al-Muẓaffar al-Ġassānī, *al-Muḥtara' fī funūn*, ed. Šāliḥiyya 1989, 96; see also Fani 2023, 71, 74, 113 (R XVIII, R XXIX, MM V.13). The procedure for reading the sealed documents also appears in chancery manuals, for example in Ibn al-Mudabbir, *al-Risālat al-'aḍrā'*, ed. Mubārak 1931, 28–29.

61 Al-Iskandarī, *al-Ḥiyal al-bābiliyya*, ed. Qārī 2018, 181 (no. 209); al-Zarḥūrī, *Zahr al-basātīn*, ed. al-Qārī 2012, 142 (no. 125); see also Raggetti 2021b, 161 (§ 6.1.7), 168 (§ 6.3.15).

62 Raggetti 2021b, 52–57 and throughout; al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020.

63 Al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020, 326–327, § 22.3.

64 Al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020, 326–327, § 22.4.

5 Case studies: Technical variants in a fluid tradition

The two main concepts upon which this text focuses – durability and stability – have also influenced the reception of these textual materials, which have evidently succeeded in surviving through time and space, but, due to their peculiar structure in micro-textual units, bear the traces of very fluid traditions, which undermine the concept of textual stability and fixity. An intertextual analysis allows us to highlight the correspondences among the different traditions and to focus on a few case studies to gain a philological insight into the fluid tradition and the ways in which these works' transmission has performed. In fact, this analysis will highlight the (in)stability of specific recipes' transmission and the technical variants that intervene in their shift from one textual tradition to another.⁶⁵

5.1 Variants of the main ingredient

The first case study is a procedure aiming at the deletion, or more precisely the peeling off (*qaššara*), of iron-gall inks from parchment with an abrasive paste.⁶⁶ The procedure's various passages are quite consistent between the different traditions, apart from the main ingredient, which appears in different *lectiones* based on an evident palaeographical similarity in Arabic between the terms *qalī* ('alkali, sodium carbonate'; also in the variants *al-qalī* and *qalī^{mn}*), *qalīmiyā* ('calamine, mill scale'), and *qinna* ('galbanum, gum resin of *Ferula gummosa* (L.)'). The fact that al-Rāzī's treatise is the most ancient of the discussed sources discussed suggests the hypothesis that *al-qalī* is the 'original' ingredient of this recipe. Nonetheless, the fact that we know the work via a unique witness (and quite a late one) cannot rule out the possibility that *al-qalī* was a variant generated by the copyist of that specific witness, or earlier in the transmission of the text.⁶⁷ What we can say is that calamine, or mill scale (that is, the scoria of certain metals in fusion),⁶⁸ appears only in this occurrence and nowhere else in the different textual traditions on ink

⁶⁵ Appendix 1.

⁶⁶ Appendix 2.1.

⁶⁷ Manuscript Cairo, Dār al-Kutub, Mağāmi' Tal'aṭ 33 (al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011). For a description of the witness see Zaki 2011, 226–227; Fani 2023, 62–64.

⁶⁸ Kās 2010, vol. 1, 258–262; Ibn al-Bayṭār 1877, no. 1826.

erasure, or, more generally, on bookmaking. Thus, *al-qalī* can easily be a *lectio faciliior*.

The very fluid transmission of these recipe compilations is probably at the base of the duplication of the recipe (MM V.8, MM V.10) in the Yemeni treatise attributed to al-Muẓaffar al-Ġassānī: it is in fact possible that he, or whoever compiled the work in his name, had access to different witnesses of Ibn Bādīs's treatise and that, based on a variant reading, duplicated the recipe with two different ingredients within his own compilation. After all, the galbanum – a gum resin – could work mechanically on the removal of the *ḥibr* to obtain the result; on the other hand, the alkali, with its high pH, could also interact chemically with the support. This example testifies to the possibility of an equally effective technical variant, intertwined with a textual misreading. It is nevertheless interesting to note that one of the sources – namely al-Ġawbarī, less specialised in book crafts – refers to employing the preparation differently, by blotting (*laṭaḥa*) the writing, or obscuring it, and not by wiping it off (*masaḥa*) as the others indicate.

5.2 A widely attested recipe

The second example is even more widespread, as it appears also in the works of illusionists and street performers, and it aims at the same goal as the previous one.⁶⁹ The preparation involves several ingredients, to be diluted with wine vinegar, made into a paste, shaped in small spheres and then dried to be rubbed on the writing. Among them, alum (*šabb*) and sulphur (*kibrīt*) – yellow or white – are common to all the sources; the alkali (*qalī*) is mentioned with its synonym 'alum of the safflower' (*šabb al-ʿuṣfur*) by some authors,⁷⁰ while it is absent in the similar recipes transmitted by al-Ġawbarī and al-Zarḥūrī; as in the previous example, al-Muẓaffar al-Ġassānī substitutes *al-qalī* with *al-qinna*, but he also gives the alternative option of *šabb al-ʿuṣfur*, notwithstanding the different nature of the two ingredients. Al-Iskandarī is the only one who adds ammonium salt to the preparation. A further ingredient, which is absent in al-Iskandarī and al-Qalalūsī, offers another example of palaeographical variant in the other sources, as it appears as

⁶⁹ Appendix 2.2. Only al-Iskandarī mentions papyrus and paper along with parchment at the beginning and at the end of the recipe. The verbs used for the erasing (*qala'a*, *maḥā*) are quite common ones with no direct reference to a specific technique.

⁷⁰ Ibn al-Bayṭār 1877, no. 1828.

maşl (whey), *muql* (bdellium), and *başal* (onion); al-Ġawbarī, quite originally, substitutes this with gallnuts (*ʿafş*).⁷¹

5.3 Same ingredient, different names

Finally, a peculiar recipe is presented by al-Rāzī and is included in the later compilations by Ibn Bādīs, al-Muẓaffar al-Ġassānī, and al-Ġawbarī.⁷² It describes a whitish paste to plaster over the writing and rewrite atop it once it is dried out. The writing support for applying this technique is paper in the two oldest sources, while it is less clear in the later ones. The ink to be removed is indicated as iron-gall ink (*ḥibr*) in the titles of the recipes – which possibly could have been added later – while two cases mention carbon-based ink (*midād*) within the lines of the procedure. The common ingredients are pounded and sifted white lead and melted gum arabic, with little variation in the procedure. It is interesting to note that Ibn Bādīs is the only source to use *bārūq* to indicate white lead, instead of *isfidāğ*; he is also the only one who adds sulphur (*kibrīt*) to the two main ingredients. With the exception of al-Muẓaffar al-Ġassānī, usually quoting from the Tunisian treatise, the preparation is to be dried out in the shape of small spheres, melted when needed, daubed on the writing (the sources reference ‘mistakes’, a single ‘letter’, or ‘writing’ in general), and dried before rewriting over it.

6 Conclusions

Within the Arabo-Islamic context, as well as other linguistic and cultural environments, erasing script from writing surfaces (books, documents, and beyond) naturally developed in parallel with the establishment of written knowledge transmission. The act of writing, indeed, often requires correction, whether to rectify mistakes or to modify or remove texts that have lost their relevance or suitability, sometimes allowing repurposing of the entire writing surface. The various practices to effect it are closely linked to the concepts of material preservation of the text, namely the durability of the support and the medium used for

⁷¹ The same variants (*maşl*, *muql*) are found in a simpler version of the same recipe, with yellow sulphur, which is presented by three sources: al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 226 (no. 37); Ibn Bādīs, *ʿUmdat al-kuttāb*, ed. al-Ḥalwağī and Zakī 1971, 138 (IB IX.2); al-Muẓaffar al-Ġassānī, *al-Muḥtaraʾ fi funūn*, ed. Şālihiyya 1989, 95; see also Fani 2023, 74, 112 (R XXVIc, MM V.9); Levey 1962, 36b.

⁷² Appendix 2.3.

writing, as well as textual stability and fixity, ensuring the text's conformity to a model throughout its creation, copying, and reading. These concerns emerged early on in Islam's history, coinciding with the need to preserve and fix the Qur'anic text and other normative writings, but soon expanding to encompass the entire textual production within this linguistic and cultural context.

Descriptions and instructions regarding these practices appear in early textual traditions across various fields of knowledge and literary genres, revealing two overarching tendencies: in the first, more philological in nature, erasures, variants, and corrections remain visible on the support, creating a sort of archaic critical apparatus to the text; in the second, more pragmatic and scribal, the previously recorded writing from the support is removed, sometimes to be replaced with another text, based on different considerations. These considerations may be purely aesthetic, but also linguistic, ideological, doctrinal, or even deceptive in intent. In some cases, the writing on the entire writing surface is completely removed, making the support available to accommodate a new text for didactic, ritual, or economic purposes. This latter practice is what occurred, for example, in the teaching of the Qur'anic text, in the performance of apotropaic rituals, or, finally, within the royal chanceries, where reusing writing materials was for economic reasons.

The ability to make writing disappear, reveal it, or alter its appearance under certain conditions (sympathetic inks) becomes a spectacular feature, employed by court artists and street performers to captivate audiences. The crucial part of the procedures was either concealed from the viewers or simply unknown to them, as they lacked familiarity with the natural laws – namely, the chemical and physical reactions – governing the interaction of the substances involved.

These procedures, along with those for removing iron-gall inks and carbon-based inks from various writing supports, are described in the form of recipes in works which reference diverse contexts of application. An intertextual comparison between the available sources reveals the textual variants in the recipes transmitted by different authors (*loci similes*) and identifies when these correspond to technical variants. This approach offers evidence of fluid textual traditions, highlighting the permeability of literary genres and the interest generated by the capacity to manipulate natural elements in various fields of knowledge.

Appendices

Appendix 1

The following chart shows the occurrences of *loci similes* in the different sources.

Ibn Ḥunayn Iraq, 9th c.	al-Ṭabarī Persia-Iraq, mid 9th c.	al-Rāzī Persia-Iraq, 9th–10th c.	Ibn Bādīs Ifriqiya, 11th c.	al-Ğawbarī Syria etc., 13th c.	al-Iskandarī Iraq, 13th c.	al-Muzaḥḥar al- Ğassānī Yemen, 13th c.	al-Qalalūsī al-Andalus, 13th c.	al-Zarġūrī Egypt-Syria, 15th c.
IH 4								
TB 1			Q XI.4a					
		R XXVIa						
		R XXVIb	Q XI.4b					
		R XXVIc	IB IX.2	MM V.9				
		R XXVII						
		R XXVIII	Q XI.5					
		R XXXI						
		R X	IB IX.7	IS 6.1.7 a	MM V.11			
		R XI	IB IX.8	ĜB XXII.6	MM V.5	Q VIII		
		R XII	IB IX.1	ĜB XXII.5	IS 6.1.7b	MM V.7	Q XI.1	Z 6.3.15
		R XIII	IB IX.5	ĜB XX.4		MM V.10	Q XI.2	
						≈ V.8		
			IB IX.6			MM V.6	Q XI.3	
			IB IX.4					
			IB IX.3					
			IB IX.9					
			ĜB XXII.2					
			ĜB XXII.3					

Appendix 2

The following charts offer a comparative textual analysis of selected *loci similes* identified in the sources and discussed in the paper.

Appendix 2.1

Loci similes describing a procedure for removing iron-gall inks from parchment with variants in its main ingredient.⁷³

R XIII	IB IX.5	ĠB XX.4	MM V.10	MM V.8	Q XI.2
On what scrapes off (<i>qaššara</i>) the <i>hibr</i> from quires (<i>daftar</i>) and scrolls (<i>raqq</i>) of parchment and the deletion of its traces.	Another kind is when the <i>hibr</i> is scraped off (<i>qaššara</i>) from quires and scrolls of parchment and its traces are deleted.	[Taking off the writing from the document (<i>maktūb</i>).] And among those procedures:	Another kind is when the <i>hibr</i> is scraped off from quires and scrolls of parchment and its traces are deleted.	[Description of the <i>hibr</i> deletion from the books (<i>kutub</i>) and the quires.] A similar one:	Ink removal (<i>qal'</i>) from books:
Take white alkali (<i>al-qalī</i>),	Take white mill scale (<i>qalīmiyā</i>),	They take whitened alkali (<i>qalī</i>)	Take white mill scale (<i>qalīmiyā</i>),	Take white galbanum (<i>qinna</i>),	Take white alkali (<i>qalī^{mn}</i>)
crush it (<i>saḥaqa</i>)	crush it	and they crush it	crush it	crush it	crush it
and pour acid [juice] of citron on it until it becomes smooth;	with acid [juice] of citron;	with acid juice of citron until it becomes smooth;	and pour acid [juice] of citron;	with acid [juice] of citron until it becomes smooth;	and pour citron juice until it becomes smooth;
wipe off (<i>masaḥa</i>) with this the traces of the writing:	wipe off with it what you wish:	then they blot (<i>laṭaḥa</i>) the writing with it	then wipe off with it what you wish:	then wipe off with this the traces of the writing:	then wipe off with this the traces of the writing
		and they leave it to dry out;		leave it to dry out	and leave it to dry out;
it will be deleted (<i>maḥā</i>) and its traces will not be visible.	it will go away (<i>ḥaraḡa</i>).	it will delete its traces, and nothing will remain; and this is the best that I have unveiled.	its traces will go away.	and no traces will be visible on it.	it will be deleted, and its traces will not be visible on that spot.

73 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 224b (no. 18); Ibn Bādīs, *ʿUmdat al-kuttāb*, ed. al-Ḥalwaḡī and Zakī 1971, 139; al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020, 326–327, § 22.5; al-Muẓaffar al-Ġassānī, *al-Muḥtaraʾ fī funūn*, ed. Šālīḥiyya 1989, 95; al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-ʿAbbādī 2007, 41; see also Fani 2023, 70 (R XIII), 111–112 (MM V.8, MM V.10), 220 (Q XI.2); Levey 1962, 36b–37a.

Appendix 2.2

Loci similes, attested in diverse textual genres, documenting a procedure for the removal of iron-gall inks from parchment or other supports by means of a dried abrasive paste.⁷⁴

R XII	IB IX.1	ĠB XXII.5	IS 6.1.7b	MM V.7	Q XI.1	Z 6.3.15
On what takes off (<i>qala'a</i>) the <i>ḥibr</i> from the quires of parchment (<i>dafātīr</i>).	Production of what deletes (<i>maḥā</i>) the writing from quires and scrolls (<i>ruqūq</i>) of parchment.	[Taking off the writing from the document (<i>maktūb</i>).] Another example:	[Deletion of the <i>ḥibr</i> from parchment and papyri (<i>qarāṭīs</i>).]	Description of the <i>ḥibr</i> deletion from the books (<i>kutub</i>) and the quires.	Taking off the <i>ḥibr</i> from the parchment quires.	Description of a peculiar preparation to remove the <i>ḥibr</i> from parchment and other materials.
Take alum (<i>šabb</i>),	Take yellow Yemeni alum,	They take Yemeni alum,	If it is <i>ḥibr</i> , take alum,	Take yellow Yemeni alum,	Take Yemeni alum,	Take alum,
whey (<i>maṣl</i>),	bdellium (<i>muql</i>),	gallnuts (<i>ḥubb al-'afṣ</i>),		bdellium,		onion (<i>baṣal</i>)
alkali (<i>al-qalī</i>),	alum of the safflower (<i>šabb al-uṣfur</i>),		alkali,	galbanum (<i>qinna</i>), which can be substituted by alum of the safflower,	alum of the safflower,	
and white sulphur (<i>ki-brīt abyāq</i>), each in the same amount;	and white sulphur, one part each;	and white sulphur, one part each,	and yellow sulphur (<i>ki-brīt aṣfar</i>), one part each,	and white sulphur, each in the same amount;	and white sulphur, one part each;	and sulphur in the same amount;
	pound (<i>daqqa</i>) smoothly;	and pound them smoothly.	then pound them smoothly.	pound smoothly;	pound vigorously;	crush (<i>saḥa-qa</i>) everything together,

⁷⁴ Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 224b (no. 17); Ibn Bādīs, *ʿUmdat al-kuttāb*, ed. al-Ḥalwaḡī and Zākī 1971, 138; al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020, 328, 329 (§ 22.6); al-Iskandarī, *al-Ḥiyāl al-bābīliyya*, ed. Qārī 2018, 181 (no. 209); al-Muzaffar al-Ġassānī, *al-Muḥtara' fī funūn*, ed. Šālīhiyya 1989, 95; al-Qalalūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-'Abbādī 2007, 41; al-Zarḥūrī, *Zahr al-basāṭīn*, ed. al-Qārī 2012, 142 (no. 125); see also Fani 2023, 69–70 (R XII), 111 (MM V.7), 220 (Q XI.1); Levey 1962, 36b; Raggetti 2021b, 161 (§ 6.1.7[b]), 168 (§ 6.3.15).

pour wine vinegar on the mixture and grind it till it becomes like egg yolk (<i>muḥḥ</i>),	pour wine vinegar on the mixture and grind it till it becomes like grease (<i>ṣaḥm</i>),	Then they pour wine vinegar and grind it till it becomes like an ointment (<i>marham</i>)	Pour wine vinegar, till it becomes like an ointment, then leave it to rest for one day till it dries off (<i>našifa</i>); when it becomes like a paste (<i>ʿaḡīn</i>)	pour wine vinegar on the mixture and grind it smoothly,	pour wine vinegar on the mixture and grind it till it becomes like [the consistency of] the brain (<i>dimāḡ</i>).	and pour vinegar till it becomes like an ointment.
then make this into the shape of an acorn (<i>ballūṭa</i>).	then make this into the shape of an acorn.	which they then make into the shape of an acorn	make this into pieces (<i>ašyāf</i>)	then make this into the shape of acorns.	Then make it into the shape of pastilles	Then make this into the shape of acorns.
Make it dry out (<i>šaffafa</i>),		and make it dry out in the shade.	and leave it to dry out.	Make it dry out in the shade.	and make it dry out in the shade.	
			You must have added ammonium salt (<i>nušādir</i>) to it, and the alum must be the Yemeni one.			
then rub off (<i>ḥakka</i>) the <i>ḥibr</i> with it from the quires and scrolls (<i>ruqūq</i>) of parchment and from the leathers (<i>ḡulād</i>).	Rub off what you wish with it, and you will see it white, in <i>šāʿ Allāh</i> .	They rub off with it the ink and what they wish from the quires, and the writing is deleted; it disappears, leaving no trace at all.	Rub with it the area where the <i>ḥibr</i> is – both on paper (<i>kāḡad</i>) and on other materials – and really its traces will disappear.	Rub (<i>dalaka</i>) with it the <i>ḥibr</i> from the quires and the scrolls.	Rub off the <i>ḥibr</i> with it wherever you wish to make it disappear.	Rub off the writing with it and this will disappear. This is a peculiar preparation, you have to learn it!

Appendix 2.3

Loci similes of a procedure describing a whitish paste used to cover existing writing and permit overwriting, featuring lexical variants related to its main ingredient.⁷⁵

R XI	IB IX.8	ĠB XXII.6	MM V.5	Q VIII.d
Deletion (<i>maḥū</i>) of the writing from paper (<i>kāḡad</i>) so that it will be rewritable, and the deletion will not be visible.	Another method for [<i>ḥibr</i>] deletion from paper.	[Taking off the writing from the document (<i>maktūb</i>).] Among the various methods they take off (<i>qala'a</i>) the writing from books:	As for what deletes the <i>ḥibr</i> from quires (<i>dafātir</i>) [of parchment?].	As for the coating (<i>ṭilā'</i>) overlaying the writing when someone dislikes it:
Take one <i>dirham</i> of white lead (<i>isfidāḡ raṣāṣi</i>) and sieve it with a piece of silk;	Take white lead (<i>bārūq</i>),	they take white lead (<i>isfidāḡ al-raṣāṣ</i>)	Take one part of pure and clear gum arabic	Take the fixed weight of white lead (<i>bayāḡ abyāḡ</i>) and pound it thoroughly, then sieve it with a piece of silk.
then take the same weight of gum arabic cleaned from its wood and dust;	gum arabic,	and gum arabic, one part each.	and one part of white lead (<i>isfidāḡ</i>)	Take the same weight of gum purified from [the residues] of its wood and its pot (<i>qidr</i>),
add a bit of water to it, but do not exaggerate with it: add it just until it melts,			then melt (<i>balla</i>) the gum with water till it liquefied (<i>inḥalla</i>) and dissolved (<i>dāba</i>)	moisten it with a little water without exaggerating, and let it melt.
	and sulphur (<i>kib-rīt</i>), one part each;			
then knead it with the white lead that you had sifted finely before	pound everything together and crush it vigorously,	The white lead is pounded and sifted, and the gum melted. Then they knead the latter with the white lead,	and knead it with the white lead, after having pounded it and sifted;	Then knead with it the white lead that you had sifted, making a stiff paste,

75 Al-Rāzī, *Zīnat al-kataba*, ed. al-Qārī 2011, 224a (no. 16); Ibn Bādīs, *ʿUmdat al-kuttāb*, ed. al-Ḥalwaḡī and Zakī 1971, 139–140; al-Jawbarī, *The Book of Charlatans*, ed. Dengler 2020, 328, 329 (§ 22.7); al-Muẓaffar al-Ġassānī, *al-Muḥtaraʾ fī funūn*, ed. Šāliḥiyya 1989, 94; al-Qalālūsī, *Tuḥaf al-ḥawāṣṣ*, ed. al-ʿAbbādī 2007, 38; see also Fani 2023, 69 (R XI), 110–111 (MM V.5); Levey 1962, 37a.

and make it into the shape of hazelnuts (<i>banādiq</i>).	then make it into [the shape of] hazelnuts.	make it into [the shape of] hazelnuts,		and make it into the shape of hazelnuts.
Put them in a small earthenware vessel (<i>fahḥāra</i>) or in a clean walnut shell until they dry out.	Make them dry out in the shade.	and dry these in the shade.	Then put the preparation in a shell (<i>maḥāra</i>), protected from dust.	Put them in a small earthenware vessel and let them dry out.
When you need, drip (<i>qaṭṭara</i>) a drop of pure water upon [one of] it and stir it with the tip of a clean <i>qalam</i> , with no trace of ink on it, and daub (<i>ṭalā</i>) it over the error (<i>ḥaṭa'</i>); do not daub it until the ink (<i>midād</i>) you have used is dried.	When you need, pour (<i>ṣabbaba</i>) a little water upon [one of] it, and daub it over the writing (<i>kitāba</i>) with the tip of a <i>qalam</i> .	When they want [to use] this preparation, they take one of these hazelnuts, pour a little water on it, stir it with the tip of the <i>qalam</i> , and daub over the writing they want to remove.	When you need, pour a little water, stir it with the tip of a <i>qalam</i> or something else, and daub it over the letters that you want to remove and make them disappear.	When you need, drip a drop of pure water upon [one of] it and stir it with the tip of a clean <i>qalam</i> , with no trace of ink on it, and daub (<i>ṭalā</i>) it over the writing (<i>ḥaṭṭ</i>); do not daub it until the ink (<i>midād</i>) is dried.
After that, leave this preparation to dry completely for one hour, then you can write on it what you want.	Then you can write on it what you want.	Then they leave it till it dries, and after that they write anything they like. Be alert to the tricks of this tribe of charlatans! Learn to detect their deeds and the things they do to deny they wronged their rights and assign rights to those who have none! They have dodges only they know. Wise up to these things!	Then leave it till it dries and write over it with what you want; do not write except on dry ink (<i>midād</i>).	After that, leave this preparation to dry completely for one hour, then you can write on it what you want.

Appendix 3

Preparation of clay crayons for teaching by the *Kātib* Abū Bakr Muḥammad ibn Muḥammad al-Qalālūsī.⁷⁶

As for the clay [crayon] (*tīn*) used for teaching, it comes in different types; among these is the one made of white lead (*bayāḍ abyāḍ*); we will mention the best ones among them, which fall into two categories: the simple ones and the compound ones (*murakkab*). As for the simple ones, they consist of Fez clay, Armenian bole, bistort,⁷⁷ and Greek ochre, all of which are substances used for teaching, without mixing them together. It is essential for the skilled craftsman to test it following a precise procedure in their work by rubbing every piece of earth on the slate used for grinding spices (*ṣilāya*), then placing it in the shade, and making them into pastilles; then the expert teaches with it, while the non-expert teaches as best as he can, [for example, using] among the plants that of turmeric, which is yellow in colour according to the reports. As for the compound ones, there are several types: [for example,] one part of white lead and two parts of ochre ground together, sieved, and made into a paste with dissolved gum, to which rose water has been added before, then made into tablets and dried in the shade. Another one is [made with] one part of bistort, one eighth of saffron, half of white lead ground together, rubbed on the *ṣilāya* with rose water, left [to dry] until it can be shaped into pastilles, then formed into pastilles and left to dry in the shade. Another one is [made with] the desired amount of turmeric, which is cooked in water until its colour is extracted, then the clear part is taken, and this water is set aside; at this point, one part of minium (*zarqūn*) and one part of white lead are taken, then rubbed on the *ṣilāya* with that solution, and then formed into pastilles. Another one is [made with] one part of Fez clay, two parts of yellow earth, and dissolved gum, with which they are rubbed and then made into pastilles. Another one is [made with] one part of alkanet and one part of turmeric, ground and cooked until their colour is extracted; then the clear part is taken and put on a plate in the sun until it congeals, then it is pulverised and made into a paste with dissolved gum. There are many types of those obtained by mixing various substances, but what I have mentioned is sufficient, as the blessing lies in moderation.

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⁷⁶ See n. 17 above.

⁷⁷ The identification of this plant (*anḡubār* or *anḡibār*) is not certain, but it is most likely the *Polygonum bistorta* L. (see Bedevian 2006, s.v.), from whose rhizome a yellow or brownish pigment and starch are extracted. The starch, when mixed with other flours, has been used since ancient times in baking. It is probably this powdered starch that was used to obtain the chalk.

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Abbreviations

GAL S = Carl Brockelmann, *Geschichte der Arabischen Litteratur, Supplementband*, 3 vols, Leiden: Brill, 1937–1942.

ĞB = ‘Abd al-Raḥīm b. ‘Umar b. Abī Bakr Ğamal al-Dīn al-Ğawbarī, *al-Muḥtār fī kašf al-asrār*.

IB = al-Mu‘izz al-Tamīmī al-Šanḥāğī Ibn Bādīs, *‘Umdat al-kuttāb wa-‘uddat dawī al-albāb*.

IḤ = Iṣḥāq Ibn Ḥunayn, *Ta’līq fī qal’ al-āṭār min al-tiyāb*.

IS = al-Ḥasan ibn Muḥammad al-Qurašī al-‘Abdarī al-Iskandarī, *al-Ḥiyal al-bābilyya li-l-ḥizāna al-kāmilyya*.

MM = Yūsuf b. ‘Umar b. ‘Alī b. Rasūl al-Muẓaffar al-Ğassānī, *al-Muḥtara’ fī funūn min al-šuna’*.

Q = Abū Bakr Muḥammad b. Muḥammad al-Qalālūsī, *Tuḥaf al-ḥawāšš fī ṭuraf al-ḥawāšš*.

R = Muḥammad ibn Zakariyyā’ al-Rāzī, *Zīnat al-kataba*.

ṬB = Abū al-Ḥasan ‘Alī b. Sahl Rabban al-Ṭabarī, *Firdaws al-ḥikma fī al-ṭibb*.

Z = Muḥammad ibn Abī Bakr al-Zarḥūrī, *Zahr al-basātin fī ‘ilm al-mašātin*.

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How to Erase Writing According to Recipes from the Arab World: Replication and Analytical Report

Abstract: This chapter investigates the methods of erasing writing, as reported within Arabic sources, by testing and replicating the procedures described in four significant treatises on the art of the book, compiled between the ninth and fourteenth centuries CE. Eleven erasing methods were systematically evaluated on ink mock-ups applied to various writing supports. The primary goal was to assess the practicality and effectiveness of these methods, while a secondary aim focused on the detectability of treatments through non-destructive analytical techniques. The findings contribute to building a database useful for comparing mock-ups with historical samples featuring erasure traces, facilitating the identification of the employed methods.

1 Introduction

The act of writing inherently includes its opposite, the act of erasing. Errors can be made, requiring the correcting of what has been incorrectly inscribed. Writing that is no longer considered important, or even acceptable, might need to be removed and the writing support recycled. Several methods to erase writing have been employed in the course of history, and, in some cases, they have been transmitted in technical handbooks and treatises. In the Arabic world, recipes recording such methods can be found in several sources and are the focus of Sara Fani's chapter in this volume.

In this chapter, we consider the same recipes but with a different intent. Our primary aim is to test the feasibility and effectiveness of a selection of these methods by replicating them in mock-up samples, trying to determine which ones were most likely to be adopted from a practical perspective. An analytical protocol was applied to observe the behaviour of the same method on different supports, or sides of the same support (e.g. parchment hair side and flesh side), and to evaluate their effectiveness. Material analysis was used to fulfil our secondary aim, which is to evaluate the detectability of the treatments with analytical techniques, and to build a database useful for comparing the mock-ups with historical samples that

show traces of erasure, in order to identify the method used in the historical examples.

Therefore, eleven erasing methods were tested on ink mock-ups applied to different writing supports. They were selected among those present in four treatises on the art of the book, compiled between the end of the ninth and the beginning of the fourteenth century: *Zinat al-kataba* (*The Ornament of the Scribes*) written by Abū Bakr Muḥammad b. Zakariyyā' al-Rāzī (d. 313 AH / 925 CE; contemporary Iraq); *Umdat al-kuttāb wa-ʿuddat dawī al-albāb* (*The Staff of the Scribes and Implements of the Wise Men*) by al-Muʿizz Ibn Bādīs al-Tamīmī al-Ṣanhāḡī (d. 454 AH / 1062 CE; contemporary Tunisia); *al-Muḥtaraʾ fī funūn min al-ṣunaʾ* (*The Findings on the Techniques of Craftsmanship*) by al-Muẓaffar Yūsuf b. ʿUmar al-Ġassānī (d. 694 AH / 1294 CE; contemporary Yemen), and *Tuḥaf al-ḥawāṣṣ fī turaf al-ḥawāṣṣ* (*The Gifts of the Wise Men on the Curiosities of the Occult Properties of Substances*) by Abū Bakr Muḥammad b. Muḥammad al-Qalālūsī (d. 707 AH / 1308 CE; contemporary southern Spain).¹

In the next section, we describe the methods employed and the process of selection, while in Section 3 we describe the preparation of the ink mock-ups and of the erasing agents, as well as their application. The methodology used to evaluate and analyse the erasing methods are described in Section 4, while the discussion of the analytical results can be found in Section 5.

2 Recipes for erasing methods

There seems to be two main aims when it comes to erasing writing: correcting mistakes and reusing the writing support. The former normally requires a precise and localized erasure aimed at correcting a, usually small, portion of text and leaving the surrounding lines intact; the latter aims at completely removing writing from the entire sheet in order to recycle the precious writing surface.² The erasing methods applied for each of these two aims are, therefore, likely to differ.

¹ The treatises have been extensively discussed in Fani 2020; Fani 2021; Fani 2023 and Sara Fani's contribution to the present volume. Other works considering the same treatises are Levey 1962; al-Abbādi 2005; Schopen 2006; Raggetti 2016. The short sigla adopted in this chapter to refer to each recipe (e.g. MM V.5; IB IX.7) are the ones used in Fani 2023.

² Censorship is another possible reason, which can affect single words, a few lines, or whole passages covering one or more folia. Such erasure thus would require different strategies depending on the portion and position of the content affected.

However, the recipes collected in the treatises only rarely specify the purpose of the erasing method (in this sense, al-Rāzī's titles are the most revealing) and seem to be arranged in no specific order.³

According to our typological study, the methods can be distributed into four main categories:

1) Substances to cover the ink

This method's aim is to cover the ink with a substance on top of which – once dried – it is possible to write again. It is likely meant to erase precise mistakes with a localised strategy. Depending on the colour of the writing support, and on the thickness of the applied layer, this method can be easily detected with the naked eye.

2) Sticky substances to remove the ink

This group of methods involves the use of a substance that can stick to the ink and separate it from the support. It is likely intended for small portions of text and to correct mistakes. These methods aim to conceal any trace of the correction.

3) Abrasive substances to remove the ink

According to their description, this group of methods seems to be suggested for a purpose resembling that of present-day erasers. This type of method could potentially be applied to a variety of cases: to remove a whole line of text or to focus on small portions.

4) Liquid substances and abrasion to remove the ink

This group of methods seems to be advantageous for erasing entire lines of text, or even the whole page, in order to recycle the writing support and produce a palimpsest, since the spreading of the liquid part of the treatment is more difficult to control.

³ In this paper we use the term 'recipe' to identify the textual entry and 'method' to describe the list of ingredients and procedures for each specific erasing process. It is important to note that a single method can be reported in different recipes, and that in a single recipe, more methods are often described.

Among the various erasing methods described in the treatises, eleven were selected for testing. The selection criteria were their representativeness (according to how systematically they were transmitted), variety, replicability, expected efficacy, as well as the availability of the raw ingredients. In Table 1, we summarise the selected erasing methods, detailing their ingredients and references to the recipes mentioning them, distributed according to the four categories identified above. The details related to their preparation can be found in Appendix 2.

Table 1: Selected erasing methods distributed according to the typological categories.

White substances	Sticky substances	Abrasive substances	Liquid substances and abrasion
Method 1 Lead white and gum arabic	Method 2 Frankincense	Method 5 Alum, whey, natron / sodium carbonate, and white sulphur	Method 8 Citron juice and vinegar
R XI MM V.5 Q VIII	R X	R XII	R XXVI Q XI.2
	Method 3 Wax	Method 6 Alum, whey, galbanum, and white sulphur	Method 9 Citron juice and white galbanum
	R X R XXVIII	MM V.7	MM V.8
	Method 4 Wax and frankincense	Method 7 Alum, blue bdellium, and yellow sulphur	Method 10 Citron juice and white calamine
	MM V.11	MM V.9	IB IX.5 MM V.10
			Method 11 Yoghurt and salt
			IB IX.6 MM V.6 Q XI.3

Although the authors of the treatises compiled their texts in different locations and time periods, they describe the same methods with minimal or no variations (e.g. method 1, reported in recipes R XI, MM V.5, and Q VIII; or method 11, de-

scribed in recipes IB IX.6, MM V.6, and Q XI.3), suggesting direct copy from older sources. In other cases, variants of similar methods can be observed (e.g. R XII, MM V.7, and MM V.9), showing changes or improvements introduced during the course of the transmission (e.g. white sulphur vs yellow sulphur).⁴ The process of transmission could have influenced the final version of each recipe in various ways – for example, introducing variants related to the ingredient used, the process, the type of ink, or writing support for which they were meant – for several reasons, such as: the subjective opinion of the single author or compiler on specific recipes; a lack of interest towards specific recipes leading to a less precise copy; missing information in the sources due to damages; differences in the adopted terminology; or a lack of need of specific recipes or parts of a recipe. It is also unclear whether the recipes' efficacy was personally tested by the authors of the treatises.

Among the most notable differences between the textual variants of the same erasing method is mention of the types of writing supports and inks that the methods are best suited for. Some particular recipes are transmitted by distinct authors for specific combinations of ink and support; for instance, methods 6 and 7 are specifically reported by al-Muẓaffar to erase *ḥibr* from parchment. In other cases, only the writing support is specified (IB IX.5) or neither of the two (e.g. MM V.6).

In Arabic, two main terms are employed to describe black inks: *midād* and *ḥibr*.⁵ The former corresponds to carbon-based inks, made by mixing charcoal or soot with a binder (usually gum arabic) in a water medium. The latter refers to iron-gall inks, obtained from the reaction between Fe(II) and tannins (phenolic and polyphenolic compounds) in a water-based medium. Iron is traditionally obtained from vitriol, a mixture of hydrated metallic sulphates, but nails, filings, slag, and solid iron are also attested in recipes. Tannins are normally extracted from gall nuts, pathological growths on oak branches and leaves, but vegetal matter rich in tannins (like tree bark, fruits, leaves, flowers, etc.) was also used.⁶

However, the terminology is not applied rigorously in the treatises: the term *midād* could also indicate plant inks or mixed inks (if the latter, sometimes followed by the specification *murakkab*), and some authors adopt the term *ḥibr* to indicate both iron-gall inks and mixed inks.⁷ A clear exception is the terminology

⁴ See Sara Fani's contribution to the present volume.

⁵ See Lane 1863, 2695–2697; Colini 2018, 18; Fani 2023, 29.

⁶ See Colini 2018, 18; Fani 2023, 29–35.

⁷ See Colini 2018, 18

adopted by al-Qalālūsī, who refers to both categories of black inks using the term *midād* indiscriminately (Q I.1–Q I.21), although he then uses the term *ḥibr* in the section of his treatise reporting recipes to erase the inks (Q XI.1–Q XI.2).⁸

When a type of ink is mentioned, the majority of the erasing methods are meant for *ḥibr*, with the exception of method 3, which is specific to *midād*. Since both ink classes have been used throughout the centuries in the Islamic world, the scarceness of methods specific to erasing carbon-based inks is surprising, but probably related to their being easier to erase due to their solubility and shallower penetration into the support. It is possible, however, that the methods for which no ink class is specified were meant to be employed for both types.

The three most common writing supports used for the production of Arabic manuscripts were papyrus, parchment, and paper. While both papyrus and parchment were already in use as writing surfaces well before the rise of the Islamic empire, the introduction of paper – which eventually replaced the other two as the preferred writing support – started in the eighth century CE. Papyrus production came to an end during the course of the eleventh century CE, and the writing support was used only sporadically after that date, mainly recycled. Parchment continued to be used for a longer period of time, especially for religious and esoteric writings. The four treatises were compiled between the end of ninth (al-Rāzī) and beginning of fourteenth century CE (al-Qalālūsī), slightly overlapping with the period of time when all three supports coexisted.

Only methods 2 and 3 are specifically described as methods to remove writing from papyrus, and both are reported exclusively by al-Rāzī (in R X and R XXVIII). It is possible that the other treatises' lack of erasing methods specific to papyrus is due to the fact that this writing support was no longer in use.

In some cases, the same method is suggested for different writing supports; for example, method 10 is mentioned as suitable for both parchment and paper in Ibn Bādīs (IB IX.5), while only parchment is mentioned by al-Muẓaffar (MM V.10).

⁸ See Fani 2023, 220.

3 Replication

In light of the selected methods and of the considerations concerning transmission, we designed the experiment to test all the reported methods specifying a precise combination of ink and support. The replication was organised as an activity within the CSMC Mobile Lab, involving MA and PhD students.

Since both *midād* and *ḥibr* were used extensively in the Islamic world, we opted to test all the erasing methods on both types. Therefore, a carbon-based and an iron-gall ink were made according to Arabic tradition. The procedures used to make the inks are described in Appendix 1. For the sake of simplicity, as this project is the first attempt to test the erasing methods reported in the treatises, mixed inks were excluded from the experiment, as were coloured inks.

As for the writing supports, it is possible that some recipes were copied from older traditions or modified in order to be applied to new writing surfaces. For this reason, we considered some additional combinations to also test the effectiveness of the methods on writing supports that were not recommended. In the case of parchment, the samples were prepared on both hair and flesh side, to verify possible variations of behaviour of the same erasing method on different sides of the support. Paper samples were sized with wheat starch according to the Arabic tradition; this procedure is also described in Appendix 1.

These considerations led to the preparation of a total of seventy samples (with the addition of one control sample per each combination of ink and support to leave untreated). Each sample, measuring around 2×10 cm, was written with the same Arabic letter (ت, *tā'*) preceded by a square. The samples were written with a modern reed pen, similar to the traditional *qalam*, a reed pen with a sharp cut at the end of the tip and a longitudinal incision along the beak, forming two flexible 'teeth'. Each ink mock-up was named with a code indicating, respectively, the support (PAP: papyrus; PH: parchment hair; PF: parchment flesh; PR: paper), the ink (C: carbon ink; IG: iron-gall ink), and the erasing method (numbered from 01 to 11). Each sample was erased on its right half, leaving untreated the left half (Fig. 1). The tested combinations for each method can be found in Table 2.



Fig. 1: Sample PH_IG_08 before and after erasure.

Table 2: Table summarising the tested combinations of inks and support for each erasing method. The ‘X’ indicates whether a combination was tested, followed by ‘i.’, ‘s.’, or ‘i., s.’, to indicate, respectively, whether the ink type, the support, or the combination of the two are specified in the recipe for the given method.

Method	Ink	Papyrus (PAP)	Parchment – hair side (PH)	Parchment – flesh side (PF)	Paper (PR)
1	C	X	X	X	X (s.)
	IG	X	X (i.)	X (i.)	X (s.)
2	C	X			X
	IG	X			X
3	C	X (i.)			X
	IG	X			X
4	C	X	X	X	X
	IG	X	X (i.)	X (i.)	X
5	C		X	X	X
	IG		X (i.)	X (i.)	X
6	C		X	X	X
	IG		X (i.)	X (i.)	X
7	C		X	X	X
	IG		X (i.)	X (i.)	X
8	C	X	X	X	X
	IG	X (s.)	X (i., s.)	X (i., s.)	X (s.)
9	C		X	X	
	IG		X (i.)	X (i.)	
10	C	X	X (s.)	X (s.)	X (s.)
	IG	X	X (i., s.)	X (i., s.)	X (s.)
11	C	X	X (s.)	X (s.)	X
	IG	X	X (i., s.)	X (i., s.)	X

The samples were erased at least two weeks after their preparation, and the instructions reported in the treatises were followed as strictly as possible, striving to replicate, in the modern laboratory, conditions that could be expected in the medieval Arabic world. The common names adopted in the treatises to refer to specific substances, translated in the editions, made the selection of some ingredients uncertain (e.g. natron, calamine, white galbanum, blue bdellium). The preparation descriptions of the erasing methods can be found in Appendix 2, while the complete list of materials used in this study is reported in Appendix 3. It should be noted, however, that we have no means to attest whether the results that we ob-

tained in preparing and applying each method were the ones meant by the authors. Therefore, each method replication should be understood as the result of our interpretation of the transmitted procedure.

4 Methodology

4.1 Effectiveness evaluation

To answer the question concerning the feasibility and effectiveness of the erasing methods, a number of parameters related to their preparation and application must be taken into consideration. These parameters – such as time needed, ease of preparation, effectiveness in ink removal, damage induced to the support – cannot individually, nor objectively, express the overall effectiveness of the methods. To limit the subjectivity of each recipe's evaluation, therefore, we drafted a form to evaluate the tested recipes (Table 3). The assessment of each parameter was based on the testing experience and on the visual observation of the erased samples.

In the evaluation forms, the total effectiveness is calculated as a sum of values attributed to each parameter out of 25. The weight of each parameter in the final sum is reflected in the value ranges (i.e. time needed for the preparation: values from 5 to 1 as time increases; support damage: values from 10 to 1 as the damage severity increases; ink removal: values from 10 to 1 as effectiveness in the removal decreases). The effectiveness evaluation results for each method is reported in Appendix 2, expressed in percentage.

Table 3: Effectiveness evaluation form: parameters. The values of the single parameters are specified for each tested method in Appendix 2.

Average preparation time (PT)	Support damage (SD)	Ink removal (IR)
5: PT < 5 mins	10: No visible damage	10: Ink is completely removed
4: PT > 10 mins	8: Little damage is visible (change of colour, minimal waving)	8: Halo is left, ink is still visible / hardly readable
3: PT > 20 mins	6: Visible damage (change of colour, waving, hardening)	6: Parts of ink are left
2: PT > 30 mins	4: Damage (change of colour, waving, hardening, shrinking)	4: Parts of ink are removed
1: PT > 40 mins	1: Severe damage (change of colour, waving, hardening, shrinking, gelatinisation; traces of erasing method left; portions of support removed)	1: No removal at all

4.2 Analytical methods

The analytical examination was conducted on the samples after applying the erasing methods and on control samples that were not erased, to understand whether markers of a specific method could be detected after the erasure. The detectability of the erasing methods, however, is still to be tested after an artificial ageing of the samples.

The samples were first examined and imaged using a three-colour Dino-Lite USB digital microscope (model AD413T-I2V), in combination with an external white-light source, to document any visible change in the sample after applying the erasing methods. They were further analysed with micro X-ray fluorescence (μ -XRF) spectroscopy to determine the elemental composition. μ -XRF measurements were performed to observe the effect of the treatments on the samples as well as to detect the residues of each method after application. Spatial maps of a selection of samples were acquired using a Bruker M6 Jetstream scanner with a Rh X-ray tube, a 60 mm² Xflash SDD detector, and an adjustable measuring spot ranging from 100 to 1000 μ m. The measurements were conducted at 35 kV voltage and 800 μ A current, with a spot size of 35 μ m, an acquisition time of 100 ms per spot, and a step size of 100 μ m. The data was subjected to further analysis on the instrument's software.

Fourier transform infrared spectroscopy (FTIR) spectra were acquired using a Nicolet iS5 FTIR spectrometer in combination with the iD7 ATR (attenuated total reflectance) module, equipped with a diamond crystal. The spectra were acquired in the range 4000–400 cm⁻¹ with a total of sixty-four scans per measurement and a spectral resolution of 4 cm⁻¹. The measurements were performed on both the erased and non-erased areas of a selection of samples, in order to determine the presence of residues, including organic components not detectable using μ -XRF spectroscopy. In specific cases, the reference spectrum of the ingredients was taken to facilitate comparison.

5 Results and discussion

The results of the effectiveness evaluation for each method – expressed as a sum of the values attributed to the three parameters considered – are reported in Fig. 2 and presented as bar charts, divided according to the four tested supports.⁹ These

⁹ For the percentage effectiveness corresponding to each method, see Appendix 2.

results are meant to be an empirical and relative evaluation of the methods tested rather than an absolute evaluation of the recipes' efficacy. These results can also suggest how commonly a specific recipe was likely to be adopted.

Methods 1, 8, and 11 proved to be the most effective in terms of ease of preparation, better ink removal, and minimum support damage on all combinations of ink and support.

The effectiveness evaluation results do not show a considerable variation depending on the ink type, although carbon ink is slightly easier to remove. On the other hand, the methods' effectiveness seems to be deeply affected by the characteristics of the writing supports. For instance, liquid and abrasive methods are unfit for porous supports such as paper and the flesh side of parchment, while method 1 is far from ideal to cover inks on papyrus, as the preparation does not adhere well to the surface and its white colour makes the erasure very visible, contrary to the same method applied to parchment and paper. In general, papyrus and parchment (hair) obtained the highest results for the removal of both ink typologies, while parchment (flesh) and paper turned out to be more challenging types of support to be erased, showing low values for both ink removal and support damage.

As for the indications of inks and writing supports expressed in the recipes, we noticed that methods 1, 2, 3, 7, 8, 10 (parchment according to MM V.10), and 11 (parchment according to IB IX.6 and Q XI.3) performed well. By contrast, the indications reported in the recipes for methods 4, 5, 6, 9, 10 (paper, according to IB IX.5), and 11 (paper, according to IB IX.6), at least according to our replication attempts, do not seem to be particularly reliable.

In some cases, the tests on the additional and non-reported combinations of ink types and writing supports show even better results than the reported ones. For example, method 3 was indicated for carbon ink on papyrus, and it worked sufficiently well, but it performed even better on the samples written with iron-gall ink on papyrus or with any ink type on parchment. Method 4, which performed quite poorly on the indicated combination of iron-gall ink on parchment, gave better results on paper and papyrus, and even more so when the ink used was carbon-based. It is possible that the additional combinations were not included in the descriptions because they were uncommon when the recipes were composed, when the treatises were compiled, or when the texts were copied.

Where no precise combination of inks and support is specified (R XI, Q VIII, R X, MM V.6, Q XI.2, Q XI.3, IB IX.5), the results of the effectiveness evaluation might help understanding what the intended use of the erasing methods may have been.

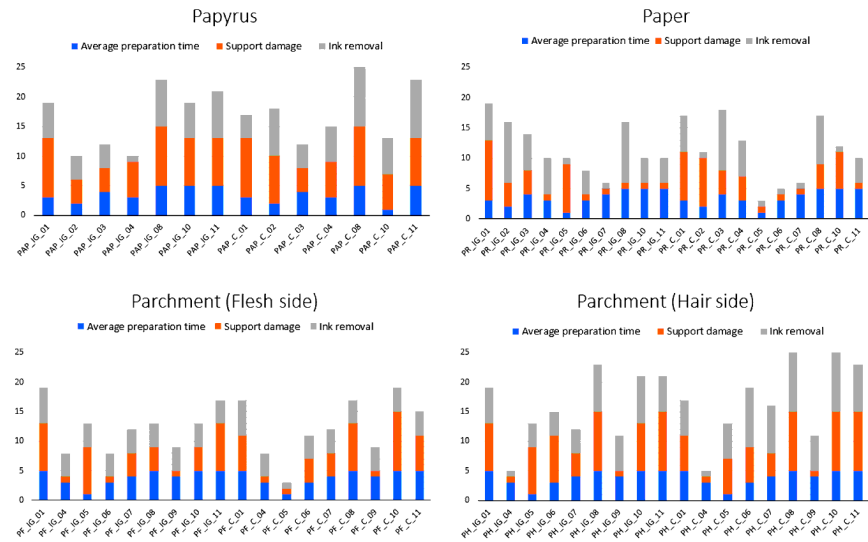


Fig. 2: Bar chart representations of the results derived from the effectiveness evaluation forms, expressed as sum of values out of 25.

The results of the X-ray analyses carried out on a selection of samples (Fig. 3) showed that methods or groups of methods can be identified by analysing the residues on the treated areas, except for methods 4 (wax and frankincense), 8 (vinegar and citrus), and 9 (galbanum), which feature predominantly organic ingredients. Methods featuring ingredients with metallic elements, like lead white (PbCO_3) in method 1 and white calamine (ZnO) in method 10, are easily detectable using μ -XRF spectroscopy, as shown in Fig. 3 in the elemental maps of lead and zinc. Methods 5, 6, and 7 feature alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) as an ingredient, and can be correlated with the presence of aluminium (Al), potassium (K), and sulphur (S) in their elemental maps. The presence of phosphorus (P) in these three methods likely corresponds to the use of whey (methods 5 and 6) and bdellium (method 7). For method 11, the presence of phosphorus (P) and chloride (Cl) can be attributed to the combination of yoghurt and salt in the recipe (Figs 4a–c). It is particularly interesting to observe the distribution of salt on the surface of the samples in the chloride map.

Coherent with what is observed via visual examination, the different porosity of the two sides of parchment is reflected in different concentrations of residues from the method applied. Therefore, the support's characteristics seem to affect the detectability of a single method; for example, method 10 left no resi-

due on the hair side, while on the flesh side a consistent amount of zinc was detected.

The results of the analysis of both μ -XRF and ATR-FTIR are summarised in Table 4. However, since the results from μ -XRF show the combined distribution of elements corresponding to our region of interest, it is difficult to attribute an element unequivocally to a specific ingredient, particularly for cases where the chemical composition is predominantly organic and therefore not detectable, like whey and yoghurt.

ATR-FTIR spectroscopy proved to be particularly useful for identifying the organic ingredients used in certain methods. Hydrocarbon absorption bands at 2915, 2847, 1462, and 718 cm^{-1} , together with the presence of three peaks at 1735 and 1171 cm^{-1} (C=O stretching vibration, esters, free fatty acids), 1476 cm^{-1} (CH_2 scissor deformation), and 733 cm^{-1} (CH_2 rocking mode) indicates the presence of beeswax,¹⁰ used as an ingredient in method 4, as shown in Fig. 5.

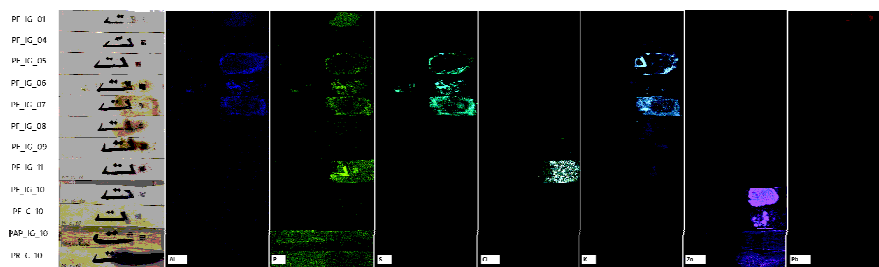
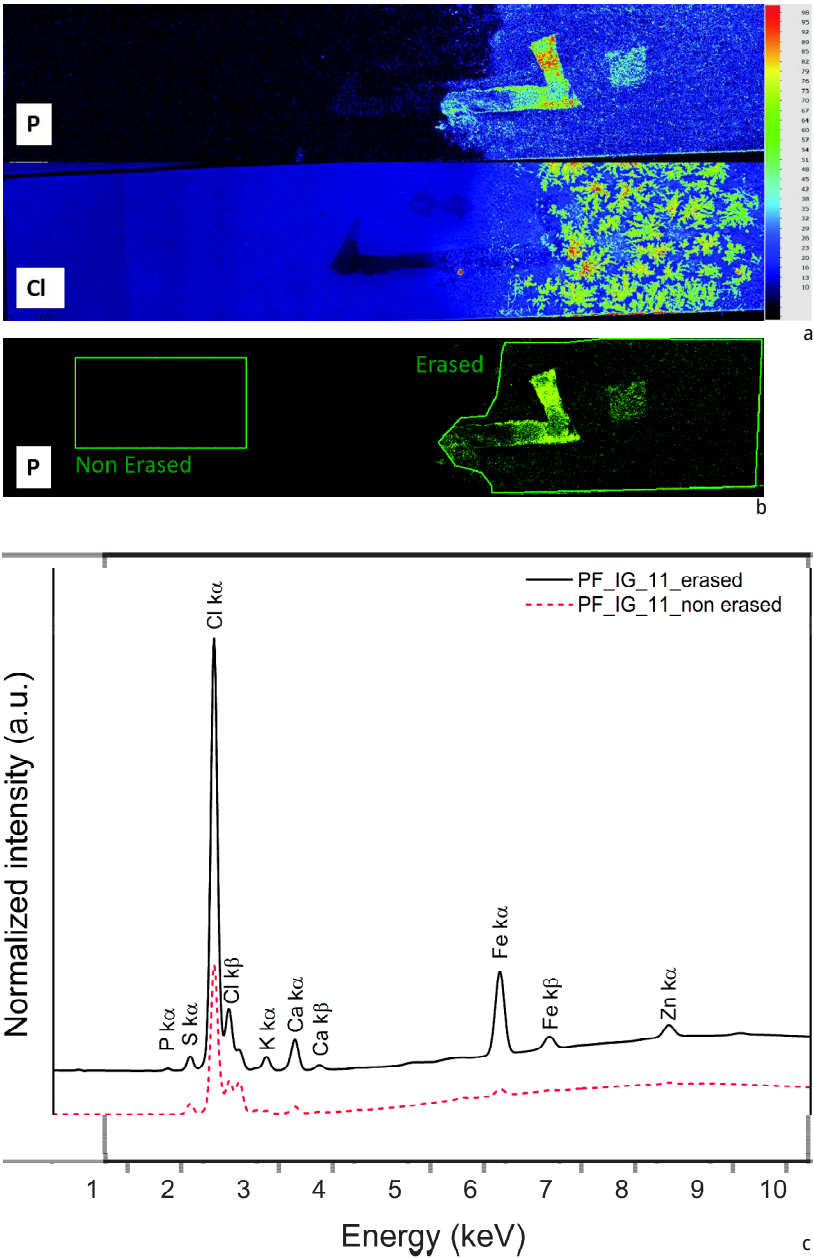


Fig. 3: Elemental maps for a selection of samples showing Al, P, S, Cl, K, Zn, and Pb distributions. Groups of methods can be separated according to the residues of the erasing technique.

¹⁰ See Svečnjak et al. 2015.



Figs 4a–c: Sample PF_IG_11: (a) Heatmaps showing distribution for P and Cl in the relative scaling; (b) Map area sampling of erased and non-erased portions based on P elemental distribution; (c) μ -XRF spectra comparison of the erased and non-erased portions.

Absorption bands at 1724, 1611, 890, 834, 632, and 616 cm^{-1} could be attributed to galbanum, which was used as an ingredient in methods 6 and 9.¹¹ Additionally, bands at 1082 and 1057 cm^{-1} were observed for method 6, and could be attributed to the presence of alum (Fig. 6).

However, it is challenging to definitively discriminate between the methods involving vinegar, wax, galbanum, and bdellium, as they are characterised by common functional groups and they are masked by the strong interference of the signals from the writing support, especially if only a low amount of residue is left on the surface.

Table 4: Summary of the results from the analytical examination of the samples.

Method	μ -XRF	FTIR	Material
Method 1	Pb, P	-	Lead white (PbCO_3), gum arabic
Method 4	-	2915, 2847, 1462, and 718 cm^{-1} (C-H); 1735 and 1171 cm^{-1} (C=O stretching); 1733 and 476 cm^{-1} (CH_2)	Beeswax
Method 5	Al, P, K, S	-	Alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$), white sulphur, whey
Method 6	Al, P, K, S	1082, 1057 1724, 1610, 889, 833, 636, 612	Alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$), white sulphur, whey, galbanum
Method 7	Al, P, K, S		Alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$), bdellium?
Method 8	-	-	Not detectable
Method 9	-	1724, 1611, 890, 834, 632, 616	Galbanum
Method 10	Zn	-	White calamine (ZnO)
Method 11	P, Cl	-	Yoghurt, salt

¹¹ Infrared and Raman Users Group transmission reference spectrum for galbanum gum (*Ferula galbaniflua*), Kremer Pigmente (62073), <<http://www.irug.org/jcamp-details?id=7123>> (accessed on 13 January 2025).

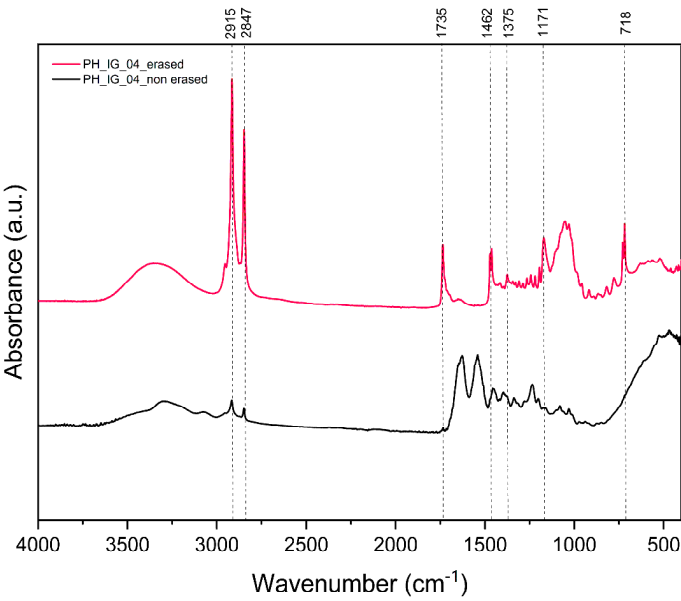


Fig. 5: ATR-FTIR spectra of erased and non-erased regions for method 4 on parchment.

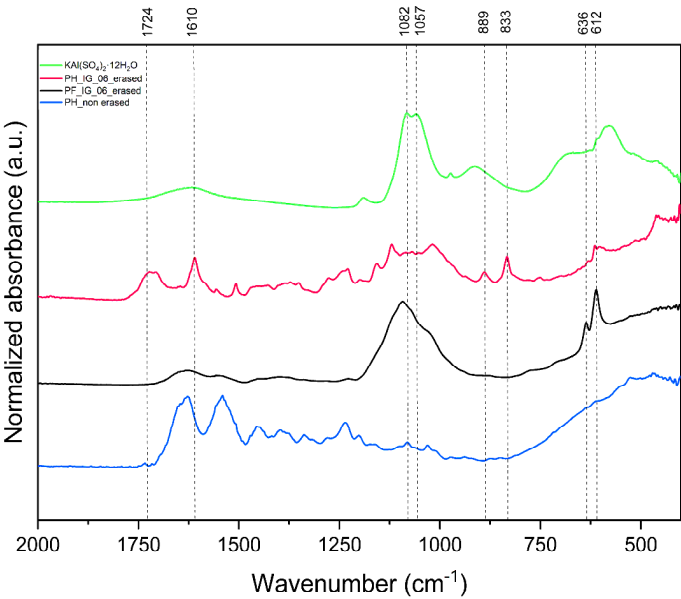


Fig. 6: ATR-FTIR spectra of erased (on parchment flesh and hair sides) and non-erased regions for method 6, compared with the reference spectrum of alum.

6 Conclusions

Thanks to the replication, we observed that the effectiveness of the methods varies greatly depending on the kind of writing support and ink we attempted to erase. Even when the recipes mentioned specific materials, the writing removal did not always produce the expected results. If, on the one hand, it is possible that we introduced mistakes in interpreting and applying the methods, it is also likely that the treatises collected the most complete and comprehensive array of options, and that such a list did not necessarily coincide with the methods truly adopted by scribes and professionals of chancelleries and scriptoria. The authors of the treatises themselves might have not tested the methods, as already observed for the recipes of black inks.¹²

It is still unclear which methods were meant to be applied by the scribe while writing, and which were used long after manuscript production. However, considering the average preparation time and characteristics of the methods, they were all meant to be applied on dry ink.

The various typologies of recipes also suggest different uses for different needs: to erase small portions of text with a precise and localised erasing strategy when mistakes occurred, or to erase big portions of the text, whether entire lines or even the whole page to produce a palimpsest. The replication also offered some suggestions in this respect: although all the methods could be applied to small portions of text, methods 8 and 11 (with a liquid component) were difficult to control and thus were most likely meant for larger areas. On the contrary, other methods would be less effective or time consuming, or both, if applied to larger areas (methods 1, 2, 3, and 4).

Our use of a newly devised form to evaluate the methods' effectiveness allowed us to investigate the preferences and choices of scribes during the act of erasing texts. In fact, the results of the evaluation show which methods were more effective on specific combinations of inks and supports, thus providing additional information concerning their possible use.

To confirm these observations, an accurate analysis of historical written artefacts showing traces of erasure is needed. In this respect, we proved that it is possible to discriminate between the majority of the tested methods by analysing their traces with non-destructive analytical methods. However, we still need to test our samples after they are artificially aged, in order to confirm the presence

¹² See Colini 2021, 134–141.

of these traces and to be able to more precisely compare our results to historical samples.

The material analysis of historical manuscripts needs to be accompanied by a codicological, philological, and historical examination to interpret the context of a correction or reuse. For instance, certain methods might have been preferred in specific practices, such as calligraphy or teaching exercises, official administrative and legal documents, religious manuscripts, or notebooks and writings for personal use. Only a cross-disciplinary approach will further our research and allow us to truly understand the processes of erasure and rewriting in the medieval Arabic world.

Appendices

Appendix 1: Recipes for inks and paper sizing

Ink	Ingredients	Replication procedure
Carbon ink	28 + 62 ml water 375 ml soot 125 ml gum arabic	– Dissolve gum arabic powder in water – Slowly add gum solution to soot powder in a mortar – Grind for 15 min – While grinding, add additional water to keep the ink flowing (we added 62 ml)
Iron-gall ink	60 + 10 + 20 ml water 6 g gall nuts 6 g gum arabic 4.5 g iron (II) sulphate	– Crush and grind the gall nuts – Add the water and leave the gall nuts in infusion for 16 hours – Boil the solution until $\frac{1}{3}$ of the water is evaporated – Filter the solution – Weigh 6 g of gum arabic and dilute it in 10 ml of water – Add the solution of gum arabic to the filtered infusion of gall nuts – Add the iron (II) sulphate in the solution and mix it – Adjust the water to get the right viscosity (we added approx. 20 ml)
Paper sizing	75 g wheat starch 500 ml water	– Add the starch to the water and leave the solution for one night – Cook the solution in microwave at 800 w for 4 minutes, stirring every 30 seconds – Sieve – Apply on paper after the solution has cooled down – Burnish the paper with a burnishing stone once the sizing is dried

Appendix 2: Descriptions of erasing methods

Erasing method	Replication procedure	Effectiveness evaluation
Method 1	– One part lead white	PAP_IG_01: 76%
Type: 1) Substances to cover the ink	– One part gum arabic dissolved in enough water	(PT:3; SD:10; IR:6)
References:	– Mix them and let them dry in a shell	PAP_C_01: 68%
– R XI (Paper)	– Add some drops of water to dissolve the preparation	(PT:3; SD:10; IR:4)
– MM V.5 (<i>Hibr</i> from parchment)	– Apply it on the dry ink with a clean <i>qalam</i>	PF_IG_01: 76%
– Q VIII (Unspecified)	– Leave the paste to dry completely	(PT:5; SD:8; IR:6)
Ingredients:	Observations:	PF_C_01: 68%
– Lead white	– The method is easy to apply.	(PT:5; SD:6; IR:6)
– Gum arabic	– The ink is still visible through the white layer if the solution is too diluted. However, if the layer is too thick, it can flake and fall apart once dried. Not convenient to erase carbon ink, as the solution tends to dissolve it, generating a grey stain.	PH_IG_01: 76%
– Water		(PT:5; SD:8; IR:6)
		PH_C_01: 68%
		(PT:5; SD:6; IR:6)
		PR_IG_01: 76%
		(PT:3; SD:10; IR:6)
		PR_C_01: 68%
		(PT:3; SD:8; IR:6)
Method 2	– Frankincense softened with some hot water, kneading it with fingers	PAP_IG_02: 40%
Type: 2) Sticky substances to remove the ink	– Apply frankincense to the support to remove the ink by sticking it and pulling it away	(PT:2; SD:4; IR:4)
Reference:		PAP_C_02: 72%
– R X (Papyrus)	Observations:	(PT:2; SD:8; IR:8)
Ingredients:	– The frankincense falls apart while using it.	PR_IG_02: 64%
– Frankincense	– The method is more effective on carbon ink on papyrus.	(PT:2; SD:4; IR:10)
	– In the case of paper, the method is more effective on iron-gall ink, but the support is delaminated.	PR_C_02: 44%
		(PT:2; SD:8; IR:1)
Method 3	– Wax softened, kneading it with fingers	PAP_IG_03: 48%
Type: 2) Sticky substances to remove the ink	– Apply wax to the support to remove the ink by sticking it and pulling it away	(PT:4; SD:4; IR:4)
Reference:		PAP_C_03: 48%
– R X (Papyrus)	Observations:	(PT:4; SD:4; IR:4)
	– The method is more effective on carbon ink.	

– RXXVIII (<i>Midād</i> from papyrus)	– As mentioned in the recipe, papyrus fibres are delaminated after a few attempts.	PR_IG_03: 56% (PT:4; SD:4; IR:6)
Ingredients:	– Paper also gets damaged, and residues are visible on the support.	PR_C_03: 72% (PT:4; SD:4; IR:10)
– Wax		
Method 4	– Two equivalent parts of wax and frankincense, heated and mixed together	PAP_IG_04: 40% (PT:3; SD:6; IR:1)
Type: 2) Sticky substances to remove the ink	– Further knead the mix with fingers	
	– Apply it to the support to remove the ink by sticking it and pulling it away	PAP_C_04: 60% (PT:3; SD:6; IR:6)
References:		
– MM V.11 (<i>Hibr</i> from parchment)	Observations:	PF_IG_04: 32% (PT:3; SD:1; IR:4)
Ingredients:	– The method is more effective on carbon ink.	
– Frankincense	– As mentioned in the recipe, papyrus fibres are delaminated after a few attempts.	PF_C_04: 32% (PT:3; SD:1; IR:4)
– Wax	– Paper also gets damaged, and residues are visible on the support.	
	– Not effective on parchment, and different response if applied on the hair or flesh side.	PH_IG_04: 20% (PT:3; SD:1; IR:1)
		PH_C_04: 20% (PT:3; SD:1; IR:1)
		PR_IG_04: 40% (PT:3; SD:1; IR:6)
		PR_C_04: 52% (PT:3; SD:4; IR:6)
Method 5	– Alum, natron, white sulphur, and whey, mixed in equal parts (by weight)	PF_IG_05: 52% (PT:1; SD:8; IR:4)
Type: 3) Abrasive substances to remove the ink	– A foam is obtained	
	– Apply the preparation on the surface, rubbing it to remove the ink	PF_C_05: 12% (PT:1; SD:1; IR:1)
Reference:		
– R XII (<i>Hibr</i> from parchment)	Observations:	PH_IG_05: 52% (PT:1; SD:8; IR:4)
Ingredients:	– Very complex and time-consuming preparation that resulted in a foamy substance. Not clear if we obtained the result meant by the recipe.	PH_C_05: 52% (PT:1; SD:6; IR:6)
– Alum	– Several tries were needed, and the best result was achieved by mixing the ingredients in equal parts according to weight.	PR_IG_05: 40% (PT:1; SD:8; IR:1)
– Natron	– The method is not effective with carbon ink as it is washed away, generating a black stain.	PR_C_05: 12% (PT:1; SD:1; IR:1)
– White sulphur	– The method worked better once the mixture was heated.	
– Whey		

	– Once dried, the method is not effective, as it turns into a powder. – Doubts arose as to whether the term '<i>qalī</i>' is intended as natron (sodium carbonate decahydrate).	
Method 6	– Alum, natron, white sulphur, and whey, mixed in equal parts (by weight)	PF_IG_06: 32% (PT:3; SD:1; IR:4)
Type: 3) Abrasive substances to remove the ink	– Shape the mixture obtained into an acorn	PF_C_06: 44% (PT:3; SD:4; IR:4)
References:	Observations:	
– MM V.7 (<i>Hibr</i> from parchment)	– Complex preparation.	PH_IG_06: 64% (PT:3; SD:8; IR:4)
Ingredients:	– The eraser is very sticky. It falls apart and sticks to gloves, especially after longer use.	
– Alum	– Hard to reshape and not durable.	PH_C_06: 76% (PT:3; SD:6; IR:10)
– Galbanum	– More effective on the parchment hair side.	PR_IG_06: 32% (PT:3; SD:1; IR:4)
– White sulphur		PR_C_06: 20% (PT:3; SD:1; IR:1)
– Whey		
Method 7	– Alum, bdellium, sulphur and whey, mixed in equal parts (by weight)	PF_IG_07: 48% (PT:4; SD:4; IR:4)
Type: 3) Abrasive substances to remove the ink	– Shape the mixture obtained into an acorn	PF_C_07: 48% (PT:4; SD:4; IR:4)
References:	Observations:	
– MM V.9 (<i>Hibr</i> from parchment)	– Time-consuming preparation. The preparation is hard to handle.	PH_IG_07: 48% (PT:4; SD:4; IR:4)
Ingredients:	– Vinegar is applied in a controlled way, not soaking the support. The alum helps rubbing the surface. As the preparation dries, it is easily removed from the support, although not completely. It behaves similar to a modern eraser.	PH_C_07: 64% (PT:4; SD:4; IR:8)
– Alum	– On parchment flesh side, fibres start coming off after a while. Paper gets delaminated.	PR_IG_07: 24% (PT4; SD:1; IR:1)
– Blue bdellium	– It is unclear whether the attribute 'blue' associated to <i>muql</i> (bdellium) refers to a special kind of galbanum or a completely different ingredient.	PR_C_07: 24% (PT:4; SD:1; IR:1)
– Yellow sulphur		
– Vinegar		

Method 8 Type: 4) Liquid substances and abrasion to remove the ink	– Citron juice and wine vinegar, mixed in equal parts – Apply the solution on the surface with a cotton pad	PAP_IG_08: 92% (PT:5; SD:10; IR:8) PAP_C_08: 100% (PT:5; SD:10; IR:10)
References: – R XXVI (<i>Hibr</i> from parchment) – Q XI.2 (<i>Hibr</i>) Ingredients: – Citron juice – Vinegar	Observations: – Very easy preparation. Very effective on both inks and indicated for the removal of big portions of text, although, with some care, smaller parts of the text can be removed. – On porous supports, its application is hard to control. Paper gets damaged.	PF_IG_08: 52% (PT:5; SD:4; IR:4) PF_C_08: 64% (PT:5; SD:8; IR:4) PH_IG_08: 92% (PT:5; SD:10; IR:8)
		PH_C_08: 100% (PT:5; SD:10; IR:10) PR_IG_08: 64% (PT:5; SD:1; IR:4) PR_C_08: 68% (PT:5; SD:4; IR:8)
Method 9 Type: 4) Liquid substances and abrasion to remove the ink	– Some galbanum soaked with vinegar and mixed with it – Apply the mix on the surface, rubbing the ink	PF_IG_09: 36% (PT:4; SD:1; IR:4) PF_C_09: 36% (PT:4; SD:1; IR:4)
References: – MM V.8 (<i>Hibr</i> from parchment) Ingredients: – Citron juice – White galbanum	Observations: – The galbanum is very sticky. At the beginning it's easy to manipulate; then, as it dries, it becomes almost impossible. Easier to apply on parchment hair side. – The method leaves yellow-brown residues on the surface of the sample. – It is unclear whether the attribute 'white' associated to <i>qinna</i> (galbanum) refers to a special kind of galbanum or a completely different ingredient.	PH_IG_09: 44% (PT:4; SD:1; IR:6) PH_C_09: 44% (PT:4; SD:1; IR:6)
Method 10 Type: 4) Liquid substances and abrasion to remove the ink	– Calamine mixed with citron juice, until the solution is well diluted – Apply the mix on the surface with a cotton pad	PAP_IG_10: 76% (PT:5; SD:8; IR:6) PAP_C_10: 52% (PT:1; SD:6; IR:6)
Reference: – IB IX.5 (Paper and parchment)	Observations: – Very easy preparation. Very effective on both inks and indicated for the removal of big portions of text, although, with some care,	PF_IG_10: 52% (PT:5; SD:4; IR:4)

– MM V.10 (<i>Hibr</i> from parchment)	smaller parts of the text can be removed.	PF_C_10: 76% (PT:5; SD:10; IR:4)
Ingredients:	– On porous supports, its application is hard to control. Paper gets damaged.	
– Citron juice	– Doubts arose as to whether the term <i>qalimiyā</i> is intended as white calamine (common name of the zinc oxide historically used, in combination with iron oxide, for medical and cosmetic application). ¹³	PH_IG_10: 84% (PT:5; SD:8; IR:8)
– White calamine		PH_C_10: 100% (PT:5; SD:10; IR:10)
		PR_IG_10: 40% (PT:5; SD:1; IR:4)
		PR_C_10: 48% (PT:5; SD:6; IR:1)
Method 11	– Spread some yoghurt on the area to be erased	PAP_IG_11: 84% (PT:5; SD:8; IR:8)
Type: 4) Liquid substances and abrasion to remove the ink	– Add some salt to the yoghurt	
	– Rub the ingredients on the surface with a cotton pad	PAP_C_11: 92% (PT:5; SD:8; IR:10)
References:	Observations:	PF_IG_11 : 68% (PT:5; SD:8; IR:4)
– IB IX.6 (<i>Hibr</i> from parchment)	– Very easy preparation. Very effective on both inks and indicated for the removal of big portions of text, although, with some care, smaller parts of the text can be removed.	PF_C_11 : 60% (PT:5; SD:6; IR:4)
– MM V.6 (Unspecified)		
– Q XI.3 (Parchment)		
Ingredients:	– Paper gets damaged.	PH_IG_11 : 84% (PT:5; SD:10; IR:6)
– Yoghurt		PH_C_11: 92% (PT:5; SD:10; IR:8)
– Salt		PR_IG_11 : 40% (PT:5; SD:1; IR:4)
		PR_C_11 : 40% (PT:5; SD:1; IR:4)

¹³ See Darnton-Hill, Ahmed and Samman 2016, 608; Bevilacqua, Borgioli and Adrover Garcia 2010, 41.

Appendix 3: Materials

Material/ ingredient	Description	Purchased from
Alum	$KAl(SO_4)_2 \cdot 12 H_2O$	
Bdelium	Oleo-gum resin extracted from various species of <i>Commiphora</i> and <i>Balsamodendron</i> . Available on the market only in combination with myrrh, which it resembles.	Kremer Pigmente (60260)
Beeswax	Natural beeswax mixed with a commercial natural candle wax	
Citron juice	Common lemon juice was used in place of citron (<i>Citrus medica</i>) juice.	
Frankincense	Dried exudate obtained from incisions or other damages on the trunk of different <i>Burseraceae</i> species (<i>Boswellia</i> spp.), bought in the bazaar of Muscat, Oman; also called gum olibanum	
Gall nuts	Fresh gall nuts from Naxos, Greece (thanks to Dr Olivier Bonnerot, who collected the gall nuts and shared them with us for this project)	
Gum arabic	Acacia gum. Dried exudate obtained from the stems and branches of <i>Acacia senegal</i> (L.) Willdenow or closely related species of <i>Acacia</i> (fam. <i>Leguminosae</i>).	Kremer Pigmente (63330)
Lead white	Common lead white ($PbCO_3$) pigment	Kremer Pigmente (46000)
Natron	Sodium carbonate decahydrate ($Na_2CO_3 \cdot 10H_2O$); common name: washing soda	Merck KGaA (71 360)
Paper	Natural cotton and hemp paper made by Gangolf Ulbricht	GMW GmbH
Papyrus	Modern commercial papyrus	Römer shop Schwarzweiss Services GmbH
Parchment	Modern commercial goat parchment	Schmedt GmbH & Co. KG
Salt	Common table salt	
Soot	Genuine beechwood soot	Kremer Pigmente (121 00)
Starch	Wheat starch powder	Kremer Pigmente (63451)
Sulphur	White sulphur collected near a sulphur water springs in Kalo Panayotis, Cyprus	
Vinegar	Common red wine and white wine vinegar	
Whey	Prepared by boiling 250 ml of 3.5% fat cow milk, pouring in 15 ml of red vinegar to separate casein and whey, then strained	

White calamine	Common name of zinc oxide (obtained from powdered calamine, ore of zinc). Its use, in combination with iron oxide, has been reported for medical and cosmetic application since 1500 BCE. ¹⁴	Kremer Pigmente (46300)
White galbanum	Galbanum (<i>Ferula galbaniflua</i>) was used, due to lack of availability of any 'white' galbanum on the market.	Kremer Pigmente. (62073)
Yoghurt	Common goat yoghurt	

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Availability of data and materials

The datasets generated and analysed during the study are available in the Re-
<<https://doi.org/10.25592/uhhfdm.16679>>.

14 See Darnton-Hill, Ahmed and Samman 2016, 608; Bevilacqua, Borgioli and Adrover Garcia 2010, 41.

Abbreviations

CSMC = Centre for the Study of Manuscript Cultures, Universität Hamburg
 ATR-FTIR = Attenuated total reflectance - Fourier transform infrared spectroscopy
 SDD = Silicon drift detector
 μ -XRF = Micro X-ray fluorescence

PAP = Papyrus
 PH = Parchment, hair side
 PF = Parchment, flesh side
 PR = Paper

IG = Iron-gall ink
 C = Carbon ink

PT = Preparation time
 SD = Support damage
 IR = Ink removal

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Transient Texts: Erasable Writing on Wood, Sand, and Metal in Northern Nigerian Islam

Abstract: Based mainly on ethnographic research carried out in Qur'anic schools and in private Islamic teaching circles, this chapter provides a description of writing practices on three distinct erasable surfaces – wood, sand, and metal – in the context of northern Nigerian Islam. We can broadly divide these writing practices into two categories: pedagogical and occult. In both cases, the use of traditional writing supports should not be dismissed as the residual vestige of a long-gone past but rather should be understood either as functional to the technical goals of the pedagogical system in which the practice is embedded or as reflecting the symbolic logic of the religious practices that it facilitates.

1 Introduction

While the fortunes of clay and wax tablets are long over, erasable writing practices persist in the vibrant environment of West African Qur'anic schools, providing a unique opportunity to study these techniques in a living tradition. The history of erasable writing surfaces in the Muslim world traces back to the inception of Islam, where it was rooted, in turn, in the cultural and religious practices of the ancient Middle East. The erasable wooden tablet has been by far the most ubiquitous tool of basic literacy skills transmission throughout the Muslim world. In the broader context of classical Muslim manuscript cultures, its use overlapped with that of non-erasable surfaces (or, at least, of surfaces for which erasure and re-writing was not the norm), such as parchment and, later, paper; in most cases, it was also propaedeutic to the latter. Islamic theology developed from Qur'anic references to the idea of a two-stage 'descent' (AR *tanazzul*) of the divine revelation: first from a heavenly 'tablet' (*lawh*; Q85: 21–22: 'indeed, it is a majestic recitation | preserved in a Tablet'), down to the angelic realm in the form of 'folios' (*ṣuḥuf*; Q80: 13–15: 'in honoured folios | elevated, purified | (written) by the hands of angelic scribes'); and then, from the latter, through the mediation of Gabriel, to a human prophet. These theological speculations nurtured an imagination that imbued both the tablet and the folios with a sacred character and prompted their

use in a pedagogy of Qur'anic literacy with deep and wide-reaching cultural meanings.¹

Regional studies on the history of the book in the Middle East,² Egypt,³ Ottoman Turkey,⁴ the Indian subcontinent,⁵ the Maghreb,⁶ and Central Asia⁷ tend to date the beginning of the decline of classical Muslim manuscript cultures to the early, the mid, or the late nineteenth century, depending on the individual region. As the increased acceptance of print technologies, favoured by the availability of cheap paper, started to impact Muslim societies to a large scale, the nineteenth century also witnessed the transformation of the classical Islamic pedagogical methods. This implied, among other things, the virtual disappearance of the wooden tablet from Muslim institutions of primary learning. In the Maghreb, the process was somewhat slower as compared to the Middle East, the Indian subcontinent, and Ottoman Turkey: in the Qur'anic schools of Morocco, Algeria, and Tunisia, the wooden tablet was still predominant in the mid twentieth century.⁸

However, in Sub-Saharan West Africa and parts of East Africa – where the history of the Islamic book has followed a different timeline and the print revolution's impact on local Muslim manuscript cultures has been less pervasive⁹ – we can observe a notable exception. Classical manuscript cultures, of which the tablet

1 For a phenomenological approach to the use of the tablet in traditional Qur'anic education, see Brigaglia 2017.

2 Atiyeh (ed.) 1995; Sadgrove (ed.) 2004; Roper (ed.) 2013.

3 Nuşayr 1994; Hanna 2004.

4 Strauss 1992; İhsanoğlu and Aynur 2007.

5 Green 2006.

6 Abdulrazak 1990.

7 Khalid 1994.

8 For recent documentaries on the use of the wooden tablet in Qur'anic education in Algeria, see Canal Algérie, 'Ain Salah: Tradition et lecture du Coran au 27 ème jour du ramdhan', video, <<https://www.youtube.com/watch?v=jcEoQq11VE4>> (Ain Salah, 2018). In Libya, see Al Arabiya, 'عمرها 7 قرون.. "العربية" في أقدم كتاتيب تحفيظ القرآن على ألواح الزيتون في ليبيا', video, <<https://www.youtube.com/watch?v=0sPWxg3Z9uo>> (Tripoli, 2023); Associated Press, 'Libyan Children Memorize Quran Using Old Method', video, <<https://www.youtube.com/watch?v=M7RUunxBpo4>> (Misrata, 2023); and Libya Al Ahrar, 'رحلتي مع الألواح إقصة كتاب', video, <<https://www.youtube.com/watch?v=czWlIXvJF34>> (Zliten, 2025). In Morocco (region of Chefchaouen), see Khalid Mouna, 'Le maître du Coran', video, <<https://www.youtube.com/watch?v=BYxTsicmO3A>> (2019). All pages were accessed on 2 January 2025. All these examples, however, appear to be marginal today in the general context of the North African countries.

9 In part, this observation is valid also with reference to the wider world of Islam. In fact, recent studies (Reese (ed.) 2022) often show that manuscript cultures and print cultures have tended to overlap in the Muslim world for longer than previously thought, and that the shift from the first to the second has never been an abrupt one.

is a central component, remain alive, especially in West Africa, to this very day.¹⁰ Muslim West Africa thus offers the ideal location for an ethnographic study conceived in the framework of a cross-cultural project of erasable media in manuscript cultures, but focused on a living, observable tradition.

All studies on the traditional pedagogy of Muslim West Africa and its transformation – its adaptation to modern contexts, or lack thereof¹¹ – have acknowledged in the region a striking persistence of classical manuscript practices and, in particular, of the wooden tablet as the preferred support of Qur’anic literacy skills transmission, calligraphy and memorisation practices. But while many, and especially the earlier ones among the above-mentioned studies, predicted an inexorable decline of the wooden tablet under the impact of modern pedagogical methods, the use of the wooden tablet, while certainly less ubiquitous today, continues to show a surprising resilience. This phenomenon is, in most cases, discussed in the light of categories such as the economic exploitation and social deprivation of Qur’anic pupils,¹² or, more sympathetically, of social theories of marginality.¹³ Studies of the Qur’anic West African schools framed as anthropologies of religion or anthropologies of literacy, or both, are comparatively rarer.¹⁴ Building on some of the insights of the latter studies, our first contention is that the persistence of Islamic manuscript practices in contemporary West Africa is not to be explained exclusively through an investigation of the failure of educational policies in post-colonial African states; rather, we must take into account the fundamental fact that the use of erasable surfaces, like wooden tablets, metallic tablets, and sand tablets, is functional to the goals of the pedagogical system in which it is embedded. Such goals being at the same time technical and cultural, our analysis moves back and forth between the description of the techniques and the cultural meanings that their users associate with them.

10 Gaudio (ed.) 2002; Krätli and Lydon (eds) 2011; Brigaglia and Nobili (eds) 2017; Brigaglia 2022.

11 Santerre 1973; Khayar 1976; Sanankoua 1985; Cissé 1992; Hassan 1992; Brenner 2001; Lounay (ed.) 2016.

12 For some examples, see Cruise O’Brien 1970; Zoumanigui 2016; Hansen 2016; Pellizzari and Sylla (eds) 2014.

13 Loimeier 2002; Bah-Lalya 2015; Hoechner 2018.

14 See, for some examples, Mommersteeg 2011; Tamari 2016; Nur 2017 (especially Chaps 3 and 4); Nur 2018. For a long-term history approach, see Ware 2014.

2 A note on method

Our paper is based mainly on ethnographic observation carried out intermittently over the last two years (2023–2024) in northern Nigeria. Many studies have observed the dynamism of traditional manuscript cultures in contemporary northern Nigeria – exceptional even for West African standards.¹⁵ By way of introduction, it might be worthwhile mentioning that, in the region, the arts of calligraphy and manuscript culture are not taught as a distinct curriculum but rather transmitted primarily as part and parcel of traditional training in Qur'anic studies.

Nigerian Qur'anic schools continue to be characterised by a high level of mobility, though certainly to a lesser degree if compared to the age that preceded the creation of the colonial boundaries. After completing their studies, scholars may decide to migrate to new lands to establish a school of their own, for a number of reasons that include financial feasibility but also, in more recent decades, safety concerns in a context of increasing insecurity (nomads vs settlers violence, Jihadism, and ethnic conflict). Students regularly travel outside their native towns and villages to attend a Qur'anic school, due to the benefits traditionally associated to 'travelling in search of knowledge' (AR *al-safar fi ṭalab al-ilm*); and, after attending a certain school for a number of years, they are likely to move to a new one elsewhere so as to diversify their sources. All of this means that these schools tend to be multilingual: languages like Arabic, Fulfulde, Hausa, and Kanuri (as well as, in certain regions, Ebira, Igala, Nupe, Yoruba, etc.) are contiguous and even overlapping. As the present paper is based almost entirely on observations made in the Hausa-speaking context of Kano and its surroundings, we refer to the Hausa lexicon to identify writing tools and practices. To refer to the Qur'anic school itself, however, instead of the generic Hausa term *makarantar allo* ('school of the [wooden] tablet'), which refers to any primary institution of traditional Qur'anic learning, but which is used mainly for part-time institutions attended primarily by children from the surrounding neighbourhood or village, we have

15 For an overview of Qur'anic arts in northern Nigeria, see Hassan 1992. For two attempts to document the work of contemporary calligraphers from Borno, see Dmitry Bondarev, 'Borno Calligraphy: Creating Hand-written Qur'an in Northeast Nigeria', video <<https://www.youtube.com/watch?v=ELQRtiteNS8>> (2015) (accessed on 6 June 2024); Mutai and Brigaglia 2017. For the short biography of a Kano calligrapher, Brigaglia 2010; for an account of the transformation of the calligraphic arts of northern Nigeria in contemporary times, Kurfi 2017; for an account of the ramifications of Qur'anic calligraphy on amulets and talisman, Adamu 2020; for a photographic volume derived from an exhibition of Qur'anic and talismanic artefacts from northern Nigeria, Brigaglia and Pezzoli (eds) 2021.

opted for the term *tsangaya*, a Hausa loanword from Kanuri. In Hausa-speaking contexts, a *tsangaya* indicates a bigger institution, often located in rural or suburban areas, where emphasis is laid on Qur'anic memorisation rather than simple Qur'anic literacy, and where students enrol on a full-time basis. A *tsangaya* offers (often modest) residential housing for the students and provides a unique socialising environment, where the Qur'an as a text, and the literacy skills associated with its study, constitute virtually the sole cultural horizon of the students. The *tsangayu* (pl. of *tsangaya*), thus, are also places where specific cultural practices and technical lexicons develop, creating a sort of confine between the 'in world' of the students and the wider society of the outsiders, even if the two share the same generic Hausa Muslim culture. In preparing this chapter, we have observed with some continuity, on several occasions in 2023 and 2024, a *tsangaya* located in the Chedi Ingawa neighbourhood of Bagadawa, a small settlement near Dawanau, about 27 km north-west of Kano. The *tsangaya* is run by *Buna*¹⁶ Dalha, a Qur'anic specialist who originates from Zaria.¹⁷ The information we gathered on the advanced teaching practices that take place in contexts more restricted than the *tsangaya* were collected through observation and interviews with *Malam A. L. M.* and *Malam Misbahu Rabi'u Inuwa*, whose priceless assistance we gratefully acknowledge.

In the context of the northern Nigerian *tsangaya*, erasable writing practices can be broadly divided into either of two categories: pedagogical (H *karatu*), or esoteric or occult (H *asraru*). The two, however, often overlap in the concrete lifeworld of the Qur'anic students and specialists, so the division between them should be understood as a blurred one.¹⁸ This does not mean that, in wider con-

16 The term *buna* (possibly derived from the Hausa term for 'a crazy horse', or from the Arabic verb *bāna*, 'to stand out') is a typical example of the specific cultural jargon of the *tsangaya*, where it is used as nickname or title to describe a person totally engrossed in his (more rarely, her) Qur'anic recitation. A *buna* has the habit of intermittently spending several days reciting the Qur'an without any break, any sleep, or any food.

17 We are thankful to *Buna* Dalha, as well as all his students, who welcomed us to their school, answered our questions, and allowed us to video-record their practices. A special thank goes to Goni Idris for his guidance. A video, made during our fieldwork, of *Buna* Dalha penning a handwritten copy of the Qur'an on paper is available here: <https://youtube.com/shorts/ZzoQrM_36Bc> (accessed on 12 January 2025). Our video of the premises of the *tsangaya* is here: <https://youtu.be/_bwXwsPnj_0> (accessed on 12 January 2025).

18 It would be a mistake to interpret this overlap as the result of an 'African' substratum swerving the 'religious' towards the 'magical'. On the contrary, such a continuity between the 'liturgical Qur'an' and the 'talismanic Qur'an' (we borrow the terms from Hamès 1997) is a reflection of the degree to which the world of the *tsangaya* is rooted within classical Islamic thought. A recent wave of studies has shown the extent to which the interest in the occult was, in the premodern

temporary Hausa society, there do not exist various forms of Islamic discourses that are sceptical or critical of occult Islamic practices, nor that *every* type of occult manipulation of the Qur'anic text is endorsed by *every* Qur'anic scholar issued from the *tsangaya* system. The discussion over what is licit and what is illicit is a fundamental register of all Islamic discourses, and the world of the *tsangaya* is no exception. We do not, however, consider this level of discursive analysis relevant to the purposes of the present contribution.

Moving to the supports of erasable writing practices, wooden tablets (H *allon karatu*; literally, 'tablet for studying') are used in the pedagogical realm for Qur'anic lessons, where students write with natural inks, memorise, and wash off the content of a daily lesson. While less ubiquitous, sand tablets (H *allon yashi*) are also used in sessions of higher learning that involve drawing signs meant to simplify the oral teaching of specific aspects of Islamic jurisprudence. In the domain of occult practices, the use of 'talismanic' wooden tablets (H *allon sha*; literally, 'tablets for drinking') involve writing esoteric formulas for the petitioner to wash off and drink; sand tablets involve the writing of elaborate alphanumerical calculations aimed at extracting certain formulas intended to produce 'seals' or talismans, as well as, in Islamic divination (AR *khaṭṭ al-raml*), the drawing of complex structures of lines and dots to derive insights into the petitioner's future. Finally, metallic tablets (H *allon karfe*) are used only as the support of very specific talismanic recipes.

The following section is subdivided according to the rewritable support used for either pedagogical or occult practices: starting from the wooden tablet, we move to the sand tablet, and, finally, to the metallic tablet.

3 Wooden tablets, reed pens, and inks

The first student that accepted knowledge through learning, not by virtue of (his) essence, was the First Intellect. He [God] commanded it to write what He taught in the Preserved Tablet that He created from it. This is why He named it a 'Calam'.¹⁹

The main goal of this section is to complement existing research on the wooden tablet's use in the pedagogical practices of the West African Qur'anic school, by

Muslim world, part and parcel of the conceptual horizon of mainstream theologians and philosophers. See, for instance, Melvin-Koushki and Gardiner (eds) 2017; Saif et al. (eds) 2020.

¹⁹ Muḥyī al-Dīn Ibn 'Arabī (d. 1240 CE), quoted in Chittick 1998, 153.

providing a summary of our observations on the practices of writing, erasure, and rewriting on wood in the contemporary *tsangaya* of northern Nigeria.

The *tsangaya*'s main goal is teaching the student a perfect memorisation of the Qur'anic text.²⁰ Paper-printed Qur'ans are inexpensive and easily available nowadays in northern Nigeria, and in the Qur'anic schools, they are commonly used for recitation purposes. From the pedagogical point of view, however, it is easy to see why many in the region continue to consider the tablet a better support for memorisation. While the folios of a manuscript or pages of a bound book, in fact, tend to be erratic, 'luring' the student, as it were, to flip them and jump from one section to another, the body of a tablet, filled only with the manageable portion of a daily lesson, induces a resolute commitment to achieving a firm memorisation before deleting the text.

3.1 Wooden tablets

The wooden tablet comes in various shapes and materials. In Hausaland, the preferred shapes (illustrated in Fig. 1 in the two main variants: for beginners, H *allon kolo*, and for advanced students, H *allon gardi*) suggest an anthropomorphic symbolism which, in our opinion, might be intentional, implying an allusion to complex metaphysical notions.²¹ As far as the material is concerned, the wood of the Egyptian balsam tree (SN *balanites aegyptica*; H *aduwa*) is reputedly the best option, as it has high solidity and durability, a smooth and bright surface, and low permeability to ink. Also attested, however, is the use of cheaper options, like wood from the jackal berry or 'African ebony' (SN *diospyros mespiliformis*; H *kanya*); shea tree (SN *vitellaria paradoxa*; H *kadanya*); neem tree (SN *azadirachta indica*; H *darbejiya*); black plum tree (SN *vitex doniana*; H *dinya*); and *Commiphora kerstingii* (H *ararrabi*).²² All the cheaper options, collectively, are known in Hausa as *farin allo* (literally, 'white tablet'), and they are immediately distinguishable from the *allon aduwa* ('Egyptian balsam tablet') by their lighter colour, as opposed to the yellowish colour of the *aduwa* wood, and by their much lighter weight compared to an *allon aduwa* of the same size.

After every use – that is, after the script on the tablet has been read up to a hundred or even two hundred times – the student of the *tsangaya* washes the Qur'anic writing off the *allo*. As the washed-off solution of water and ink contains

²⁰ On the importance of memorisation in classical Islamic culture, see Eickelman 1978.

²¹ See Brigaglia 2017.

²² Authors' fieldwork, 2023 and 2024.

the word of God, it must be kept separate from ritually impure substances (urine, faeces, blood, etc.): every *tsangaya* has several ground slopes, often near a tree, reserved for discarding the washed-off ink.²³ The *allo*'s surface may be sanded before being used again. From time to time, when the surface starts to darken due to the gradual absorption of ink, it is covered with a coating of bright limestone (H *farar kasa*); this is needed, in particular, for the *allo* of lesser quality woods, which, being more permeable to ink than the *aduwa* wood, tends to darken after every use.

The tablet (H *allon sha*) that is reserved for writing talismanic recipes that will be 'drunk' (or, in certain cases, used for a bath) by the petitioner does not normally undergo any treatment like sanding or coating. That is because, in this case, the text is not meant to be read but simply washed off and ingested; brightness and clarity are not an issue. As a consequence, with time, the *allon sha* will gradually imbibe the ink that, in each successive usage, is written on and then washed off its surface, literally dozens of times a day. The *allon sha*, thus, has a characteristic dark shade that makes it immediately distinguishable from the *allon karatu* (see, respectively, Figs 3 and 2). Moreover, due to its more intensive usage, the surface of a 'talismanic tablet' often looks irregular and 'humpy'. In Yorubaland, south-west of Hausaland, to distinguish it further from the *allon karatu*, the *allon sha* is coated in black paint before being sold, as attested by the images reproduced in Moshood M. Jimbah's volume on Arabic manuscripts in the Ilorin Emirate.²⁴

Tablets of various qualities are manufactured and sold by several dealers in Kano. One of the biggest dealers, located in the Kofar Wambai market (Fig. 4), sells an average of 3,000 tablets monthly.²⁵ Until a fairly recent past, when virtually all Muslim children attended Qur'anic school, the top-selling items were the small *farin allo* for beginners and the medium-sized *allon aduwa* for advanced students. Today, on the contrary, the top-selling item is by far the decorated wooden tablet (*allon zayyana*; Fig. 5) that is awarded as a diploma to the students who complete the first cycle of Qur'anic studies. Today, only a subsection of Kano children regularly attend a *tsangaya* and use a normal *allo* daily; the use of the decorated tablet

23 For a video recording of the students of the *tsangaya* of Bagadawa washing off their wooden tablets, see <<https://youtu.be/q4TrUg3QqY>> (accessed on 12 January 2025).

24 Jimbah (ed.) 2019, 40–41. We owe to personal communication with Moshood M. Jimbah (December 2024) the information that such tablets are not made of a dark black wood but coated in black paint.

25 Malam Nasiru Mai Allo, dealer in wooden tablets and other Qur'anic writing materials, Kofar Wambai market, Kano (interview with Dahir Lawan Mu'az, Kano, 12 December 2024).

as a certificate, however, has been retained by most of the city's private Islamic schools, as well as by the state schools, where the Qur'an is taught on printed books as part of the mandatory class 'Islamic Religious Knowledge'. This means that, whenever any secondary school class in Kano completes the first cycle of Qur'anic studies, the dealer will receive an order for several dozen *allon zayyana*.



Fig. 1: The preferred shape of the wooden tablet in Hausaland, in different sizes for students of different levels and ages.



Fig. 2: A senior student of the *tsangaya* of Bagadawa holding his *allon karatu* (note the writing style: an original form of *kanawi* with elongation of certain letters).



Fig. 3: A senior student of the *tsangaya* of Bagadawa writing on an *allon sha* (talismanic wooden tablet).

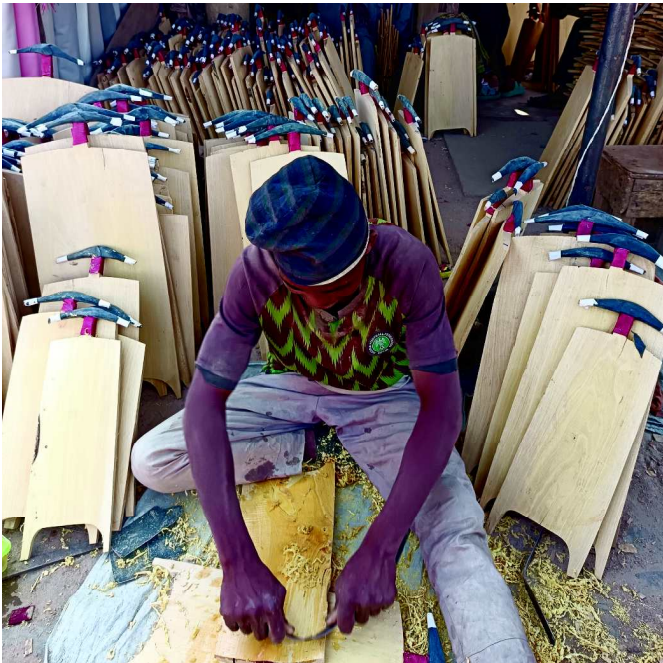


Fig. 4: The market stall of *Malam Nasir Mai Allo* in Kano. In the foreground, a cheap variety of *farin allo* is being crafted.



Fig. 5: An *allon zayyana* from the Qur'anic school of *Malam Ali Katsina* (Dorayi, Kano); photograph courtesy of Black Tarantella (Caserta).

3.2 Reed pens

The reed pen (H *alkalami*) is usually very simple, and every student of a Nigerian *tsangaya* is able to cut their own using a simple razor blade. The pen is made from the middle section of the dried stalks of gamba grass (SN *andropogon gayanus*; H *gamba*) or from those of the various corns harvested in the region: millet (H *gero*), Guinea corn, and sorghum (H *dawa*). Gamba grass is considered the best in terms of balanced ink absorption and release, but the one harvested in the dry savanna of Kano State tends to be thin and fragile. Therefore, alternative options – such as the gamba grass harvested in the wetter areas of the Nigerian Middle Belt – are often preferred for younger pupils, who tend to break the point while writing unless they use a more solid pen. Advanced students often guard their reed pens in narrow pen cases (H *korami*; Fig. 6) made of palm tree leaves (H *kaba*), which are usually hung on the *tsangaya* walls to keep the pens away from small children. Depending on the stylistic effect desired of the writing, the pen's point may be cut straight across, at right angles to the reed (H *kafe*; literally, 'straightened'), or in a slanted way (H *jirge*; literally, 'inclined'). While no strict rules exist, preferences are partly rooted in regional differences. The *tsangayu* of Borno usually adopt, for the consonantal body of the writing, a thick *kafe*, resulting in homogeneously thick vertical, horizontal, and diagonal strokes, while those of Kano often adopt *jirge*, producing a characteristic alternation of thin vertical strokes and thick horizontal strokes.²⁶ Vowels, on the contrary, are realised by the scribes of both Borno and Kano with a very thin *kafe* pen; usually, the vowelizing is done, with the suitable pen, only after completion of a relatively long portion of consonantal text (for example one page or one folio). To draw the concentric circles that mark the beginning of a *hizb* (one sixtieth) of a Qur'anic manuscript, as well as the seven bigger partitions of the Qur'an (*sub'*) and the eleven verses of prostration (*sajda*), a compass (H *alkalamin zana hizifi*) is realised by cutting multiple points in a single reed and inserting a needle in them (Figs 6 and 7). The compass may also be used in decorations that surround the text of an *allon zayyana*.

²⁶ On the *barnāwī* script, see Brigaglia and Nobili 2013. On the *kanawī* script, see Brigaglia 2011.



Fig. 6: In the foreground: *zuga* preparation for black, potable, erasable ink; in the middle ground: a compass for drawing concentric circles, a thin-pointed *kafa* pen, a thick-pointed *kafa* pen, and a *jirge* pen; in the background: a *korami* (pencase).



Fig. 7: Concentric circles in decorative *sajda* marker in a handwritten Qur'an from northern Nigeria; private collection, Milan.

3.3 Inks

The generic Hausa word for ‘ink’ is *tawada*, derived from the Arabic *al-dawāt*. The various natural ingredients used in northern Nigeria for producing permanent inks (H *yambari*) are discussed in Michaelle Biddle’s extensive study of manuscript samples from the region.²⁷ Permanent inks are normally used for writing on paper; occasionally, however, they may be used on wood for the production of *allon zayyana*. The Nigerian tradition of Qur’anic calligraphy prescribes the use of four colours for the various graphemes of the text: black for the consonantal body of the text; red for the vowels and the titles of *sūras*; yellow for the *hamzat al-qaf*’ (the Arabic letter *hamza* when in a position that demands its pronunciation); and green for the *hamzat al-waṣl* (the Arabic letter *hamza* when in a position that demands skipping its pronunciation), as well as for the decorative markers on the text margins. Thus, recipes to produce *yambari* in black, red, yellow, and green exist in the region, with a range of possible shades: red, for instance, might tend to earth brown, and green to light azure.

For obvious practical purposes, instead of *yambari*, erasable inks are exclusively used on wood. As erasable writing is not meant to be decorative, black inks tend to be the norm. In most cases, the ingredients need to be natural, as the mixture of water and ink obtained from washing off the tablet is commonly ingested, either by students to ease the memorisation of that day’s portion of the Qur’an and the symbolic embodiment of its *albarka* (H for ‘blessing’; from AR *al-baraka*), or, in the specific case of the talismanic tablet, for healing purposes. Charcoal (H *gawayi*) is the most common basic ingredient used for erasable, black, potable inks. It is usually ground on a clay potsherd (H *tsingaro*) and then mixed with water, with gum arabic (H *karo*) added as a binder and to achieve glossiness. The mixture is boiled for fifty to thirty minutes or dried for several days under sunlight, until the required texture and density is achieved. Charcoal-based erasable ink is also formed into dried balls (H *zuge*; Fig. 6). Advanced Qur’anic students usually produce their own *zuge* from the charcoal of Egyptian balsam wood: after burning the wood, they mix the charcoal with a small quantity of water and gum arabic; the paste is then moulded into small balls and dried in sunlight. When the need arises, the students dilute their *zuge* mix with water and turn it into ink. *Zuge* can also be purchased from specialised sellers.

Another technique for producing erasable ink is *wanke* (H; literally, ‘washing off’). To prepare *wanke*, the student scrapes off the thick layer of soot that forms on the bottom of pots used daily in households to cook on open flame. The pieces of crust thus obtained are first ground into a powder; then, a procedure similar to

27 Biddle 2011.

the one for charcoal-based ink is followed by boiling the powder with water and gum arabic. *Wanke* is the preferred method of ink preparation especially for junior migrant students (H *almajirai*), whose economy relies on the ties they establish with the women who live in the neighbourhood surrounding the school (or mosque) where they reside, and on performing household chores (including shopping, ironing, sweeping, and general housekeeping) in exchange for meals, clothing, or pocket money.

Erasable, potable inks can also be produced from grains. These are first grilled until they start releasing their oil, and then ground. The powder obtained is sieved before being mixed with water and gum arabic. Millet ink displays a bright grey colour, while corn and maize inks have a reddish tonality. These are among the preferred options for use on the *allon sha*. In specific talismanic recipes, sugar, saffron, or honey are added to grain-based inks; saffron may even be used alone. Grain-based inks and saffron-based inks are immediately recognizable, as they are the only inks used on the wooden tablet that are not black.

3.4 Innovation in talismanic writing

The complex and laborious writing practices of Islamic talismans inspire innovations to overcome certain challenges, which are constantly adopted in the field. The most basic notions involved in talisman-making are (1) not only words (of the Qur'an, of the divine names, etc.) but also individual letters of the Arabic alphabet have powers (AR *'ilm al-hurūf*; 'science of the letters'); (2) the letters that compose words or phrases can be converted into numbers (*'ilm al-ḥisāb*; 'numerology'), maintaining their properties intact; and (3) such properties can be enhanced and multiplied by combining letters and numbers in specific arrangements (*'ilm al-awfāq*; 'talismanic science'). As a result, to fully exploit the power of certain formulas, these have to be written a specific amount of times, which after a series of complex additions and multiplications – similar to the chemical process of elements decomposition – might reach extremely high figures. To give just one example among literally hundreds of possible ones, the divine name *al-Laṭīf* ('the Subtle') is believed to be a powerful means for protection and, generally, to ease one's affairs. A practitioner may thus instruct a petitioner to recite this divine name 129 times, which corresponds to the sum of the numerical value of its letters, or, better, to ingest the ink washed off a tablet upon which the name *al-Laṭīf* has been written 129 times. To enhance the formula's power, the number of recitations or writings may be prescribed as 16,641 (that is, 129×129). And to target a specific aim, this number may be multiplied by the figure corresponding to the numerical value of the name of the person 'targeted' by the talisman (in this case, the petitioner), easily reaching figures over a million. Similarly and conversely,

these figures, just as in the chemical process of synthesis, may be then distilled down into a ‘seal’ (AR *khātim*; H *hatimi*), which usually takes the form of a diagram (AR *jadwal*; not necessarily a magic square *stricto sensu*)²⁸ that combines figures in such a way that, when rows and columns are added, the figures corresponding to certain intended numerical values are obtained. Fig. 8, for instance, shows an *allon sha* inscribed with a relatively simple *hatimi* created by ‘reducing’ the numerical values of the names *Allāh* (66) and *Muḥammad* (92), after the latter have been ‘decomposed’ through a series of multiplications.

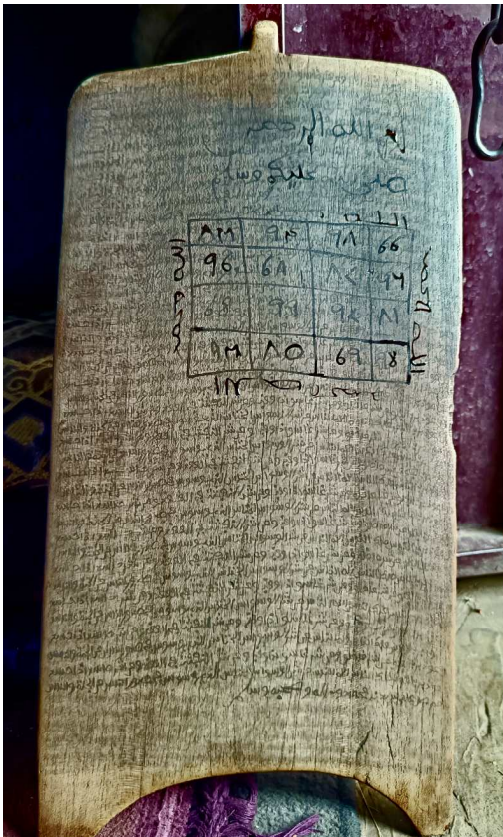


Fig. 8: A talismanic wooden tablet (*allon sha*) with an alphanumerical seal (*hatimi*).

²⁸ In the ‘magic square’, the figures composing rows, columns, and diagonals, when added, have to give the same total. In a normal *jadwal*, the sums of rows and columns are often different, each symbolizing the numerical value of one of the words or phrases used in composing the talisman.

In the past, whenever Qur'anic scholars specialising in talismanic recipes had to produce a drinking potion that required writing a specific formula a huge number of times, they would divide the job among a group of their students. If, for instance, the specialist prescribed a petitioner to drink the distilled solution of one million *basmala* (the introductory formula of all Qur'anic chapters; *bismi l-lāhi l-raḥmāni l-raḥīm*), the scholar would assign to, say, one hundred of his students the task of writing the *basmala* ten thousand times each on their tablets. The one hundred bottles containing the solution of ten thousand *basmala* each would then be given to the petitioner, either separately or in one big water bin. To speed up these processes, some technical innovations were, at times, devised. For instance, some students might use a multi-pointed pen created by tying together a number of reeds (Fig. 9), allowing multiple identical sentences to be written in the same time required for a single sentence written with a standard, single-pointed reed.



Fig. 9: A multi-pointed reed; screenshot from a video originally posted on the Facebook group Mu Koma Tsangaya, the biggest social media gathering place for Nigerian *tsangaya* students; now available at the link <<https://www.facebook.com/ElHadjiMoussaHanne/videos/276837306837149/>>, video, accessed on 2 January 2025.

A further and more recent innovation in the field of occult erasable writing practices is using stamps to block print talismans. This technique involves carving relatively long Qur'anic verses, entire *sūras*, special prayers, or numerical seals (H *hatimai*) onto wooden blocks. After pressing the block on a sponge dipped in the usual erasable and potable ink, it is used to print the required formula multiple times in a quick fashion (Figs 10 and 11). The specialists able to produce such stamps are rare in Kano, for having the two skills of woodcarving and Arabic calligraphy required for this task

is rather unusual. Although block-printed amulets have a long history in Muslim societies,²⁹ their use is not attested in the literature on West Africa, and our fieldwork seems to confirm that, in Nigeria, block printing is considered a recent innovation, prompted by the drop in the available manpower (i.e. full-time Qur'anic students) for producing written talismans.³⁰ It should be noted, however, that such blocks for printing talismans will never be used on the traditional wooden *allo*, but only on paper. However, as the ultimate purpose is always washing off the writing and drinking the solution, the block print overlaps with another relatively recent innovation: water-resistant folios that, once dipped in water, release the ink without disintegrating. If they are of good quality, water-resistant folios may also be sun-dried and used again. A similar time-saving technique that has emerged in recent times among the Islamic scholars who specialise in occult practices is using printer ink cartridges: once emptied of their industrial ink and washed out, the cartridges are filled with homemade, potable, erasable inks, then used to quickly print multiple copies of computer-typed formulas, which are dipped into water before the latter is drunk.³¹



Fig. 10: On the left, a stamp for block printing the ninety-nine names of God; on the right: a stamp for block printing the verses containing the phrases *kun fa-yakūn* (Q36:82: ‘Let it be! And it [instantaneously] is’), with a complex seal (*hatimi*) extracted from these verses.

²⁹ See Schaefer 2006.

³⁰ Authors’ interviews with Qur’anic scholars and students, Kano, 2023–2024.

³¹ Karimu Adejare Amao, known as Baba Kishi, a Muslim scholar and occult practitioner from Ibadan (telephone interview with Andrea Brigaglia, August 2020).



Fig. 11: From the top, clockwise: stamps for block prints of *hatimai* (seals) of the invocation known as *Ḥizb al-sayf*, the invocation known as *Ṣalāt al-fātiḥ*, the *sūra al-Fātiḥa* (Q1), and the ‘Verse of the Throne’ (Q2:255).

4 Sand tablets

Writing on sand, too, can serve both pedagogical and occult purposes. The sand tablet (H *allon yashi*) is a framed, rectangular wooden tray that contains a thin layer of sand. In the pedagogical realm, the *allon yashi* is the support of a teaching practice scholars may choose to engage in during advanced sessions of *fiqh* (Islamic jurisprudence). This practice is known in Hausa as *larabi* (from AR *ḍarb*; ‘hitting’ or ‘multiplication’). Rather than in big and relatively visible institutions like the *tsangaya*, the teaching sessions that employ *larabi* normally take place in the private setting of a scholar’s house and are attended by a select group of students of advanced jurisprudence. The sand tablet, thus, is not as ubiquitous and familiar to ‘outsiders’ as the wooden tablet.

As for the sand tablet’s use in occult practice, in this context it is usually called *bugu*, which is the literal Hausa translation of *ḍarb*; thus, it technically can be considered a synonym of the Arabic loanword *larabi*.³² In this case, however, the term refers to the complex calculations through which talismanic formulas are extracted from Qur’anic verses or divine names before being used in various ways (including on the *allon sha*). A third use of the sand tablet, also pertaining to the domain of the occult, is the practice of geomancy (AR *khaṭṭ al-raml*; H *bugun kasa*), which is the most common form of divination in Hausaland and in Muslim societies in general.³³

32 The classical Hausa dictionary of George P. Bargery gives both meanings (jurisprudential and occult) for *larabi*, according to the following definitions: ‘1. Explaining the meaning of religious injunctions and prohibitions, their exceptions and reservations. [...] 2. The markings made on the ground by a fortuneteller’ (Bargery 1934). It is perfectly possible that at the time in which Bargery collected the materials for his dictionary, *larabi* was used for both jurisprudential and occult practices on the sand tablet, and that the shift of meaning we have observed (with the Arabic loanword *larabi* being restricted to the jurisprudential domain, and the Hausa synonym *bugu* to occult practices) has occurred during the generations that followed, based on an intuitive association of the Arabic term with legal orthodoxy, and of its Hausa synonym with ‘local’ occult practices. Bargery, however, also includes a reference to occult practices (and not to jurisprudential teaching) under the heading *bugu* (‘beating’), where he gives, as the third possible meaning of the term ‘3. Calculation; mathematical work’, and then, in sub-example 3.b, the phrase ‘*ana bugun hatimi*, “the seal is being affixed”’ (Bargery 1934), which we would actually translate as ‘the talismanic calculation is being made’.

33 For a classical historical study on *khaṭṭ al-raml*, see Fahd 1966. For an introductory reflection on geomancy in West African Muslim contexts, see Brenner 1985, 34–51. The influence of Islamic geomancy in Africa extends well beyond Muslim-majority groups like the Hausa. Its influence on the divinatory practices of non-Muslim peoples of southern Benin, for instance, was noticed as early as the 1940s by Bernard Maupoil (1943). Islamic origins also have been suggested for the

4.1 *Larabi*

As opposed to the *tsangaya*, where the main purpose of study is memorisation, the main goal of higher Islamic studies sessions, where *larabi* may be used, is understanding (of theology, jurisprudence, literature, exegesis, etc.). While the main teaching support of these sessions is always an Arabic textbook (AR *matn*), it is not normally recited and memorised as the Qur'an is in the *tsangaya*; rather, the textbook is read, translated into a local language (in our case, Hausa), and explained orally. The teacher may also add as much commentary as he (and, more rarely, she) deems appropriate, often referring to alternative opinions or quoting Qur'anic verses and hadiths that support the ruling under discussion.³⁴ In a way, the sand tablet's function in these sessions may be considered similar to that of the blackboard, the whiteboard, or the PowerPoint in a classroom setting: to focus the students' attention on certain bullet points. *Larabi* practices, however, never involve writing full phrases but rather consist of either (1) drawing bigger and smaller dots whose meaning is explained orally, or (2) performing complex mathematical calculations (usually, proportional reductions) needed in the Islamic ruling on the division of inheritance. Always sitting on the floor together with a small circle of students, the teacher may, when he discusses issues of jurisprudence that involve either lists and sublists or mathematical calculations, take the *allon yashi* that he keeps on his right-hand side, draw the required dots or figures, and then easily wipe away the writing with his right hand for a subsequent lesson.

Our video recording shows one example of *larabi* of type (1). The lesson is on the chapter of the *Risāla* of Ibn Abī Zayd al-Qayrawānī (d. 996 CE) on the rulings of ritual ablution according to the Māliki school of law.³⁵ The statement under discussion is '*wa-man ḍaḥika fī al-ṣalāt a'adahā wa-lam ya'ud al-wuḍū*' ('whoever laughs during the ritual prayer must repeat it, but he does not need to repeat the

divinatory practices of the Mande-speaking people of West Africa (Kassibo 1992), as well as the Tswana of southern Africa (van Binsbergen 1996). For an interesting reflection on Islamic *khaṭṭ al-raml* and the history of religions in Africa, see Brenner 2000. See also Wim M. J. van Binsbergen, 'Islam as a Constitutive Factor in African 'Traditional' Religion: The Evidence from Geomantic Divination', unpublished paper, <<https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=f03c0e7e19e7608bbff7bfb47af8bffa694d83f3b>> (accessed on 11 April 2023).

³⁴ See, for an excellent overview of higher private Islamic studies in West Africa and the insights they may provide to both anthropological and linguistic studies of the Muslim societies of the region, Tamari 2002 and 2008.

³⁵ We have observed this use of *larabi* in teaching this section of al-Qayrawānī's *Risāla* in many scholars' private teaching circles, which were not, however, video-recorded. To illustrate it, we have realised a brief video in which one of us performs the practice as observed during field-work: <<https://www.youtube.com/watch?v=W6hFju5K3xo&t=21s>> (accessed on 12 January 2025).

ritual ablution'). The teacher orally comments on the statement detailing and categorising the situation into three different scenarios, visually represented by three big dots on the sand tablet, as follows:

- The person who is praying alone (*al-fadd*). If the individual:
 - laughs deliberately;
 - laughs unintentionally;
 - or is overcome by laughter, his prayer becomes invalid.

The above threefold scenario is represented by three smaller dots on top of the first big dot.

- The person who is leading a collective prayer (*imām*). If the imam laughs deliberately:
 - both his prayer and the prayers of those following him (*al-ma'mūm*) become invalid.

This second scenario is represented by one small dot on top of the second big dot.

- If the imam laughs unintentionally or is overcome by laughter:
 - his prayer;
 - and the prayers of the congregation become invalid. In the latter case, another individual from the congregation must take his place and assume the role of imam.

This scenario is represented by the remaining two small dots on top of the second big dot.

- The person who is following an imam (*al-ma'mūm*). If the individual who is following an imam:
 - laughs deliberately;
 - laughs unintentionally;
 - or is overcome by laughter, his prayer becomes invalid.

These three final scenarios are represented by the three small dots on the top of the last big dot.

Most northern Nigerian scholars continue to use the sand tablet for *larabi*. However, as no material or symbolic reason binds *larabi* exclusively to the sand tablet, innovations can be observed and are likely to occur more often in the future. Shaykh Amīn Bamba al-Faraḍī, for example, is a Ghanaian scholar who was trained in Māliki jurisprudence in the traditional circles of Kano and who – as his nickname al-Faraḍī suggests – is renowned for his knowledge of *'ilm al-farā'id* ('division of inheritance').³⁶ When explaining the complex casuistry relative to the

³⁶ Amīn Bamba al-Faraḍī (interview with Andrea Brigaglia, Ejora, Ghana, October 2007).

categories of people inheriting from a deceased, and the proportional reductions that regulate the division of the share, Bamba reproduces with a marker on a whiteboard the *larabi* lessons that, in all likelihood, he originally learned on a sand tablet from his teachers in Kano.³⁷

4.2 *Bugu*

As their methods rest largely on a logic of symbolic associations, *bugu* practitioners might opt for a wider range of sands to use in their tablets than *larabi* users, for whom the type of sand is largely irrelevant. A practitioner of *bugu* might, for instance, prefer white desert sand (*farin yashi*) when engaged in extracting God's 'supreme name' (*al-ism al-a'zam*), which is used in invocations, since whiteness symbolises purity. Similarly, he may opt for, say, the red sand from a termite mound or the burrow of a fennec fox when producing specific talismans whose goals are associated with the characteristics of these animals³⁸ – the complex social life and industriousness of the termite, for instance, or the nocturnal hyperactivity of the fennec.

One of the 'supreme names' of God that has a long history in Sufism is the formula *أهم سقك حلع يص* (*aham^{um} saqak^{um} hala^{um} yaş^{um}*). *Bugu* practitioners derive this through various alphanumerical calculations from a number of Qur'anic verses or Qur'anic divine names. To perform such calculations, practitioners always use the sand tablet as opposed to paper: with the index finger of the right hand, they write letters and corresponding figures; they then multiply them by a specific number, and after deleting the previous row with the palm of their right hand, they write the result of the multiplication, repeating the operation until arriving at a number that corresponds to the numerical value of the 'supreme name'.

³⁷ See one example of his *larabi* lesson on inheritance at <<https://www.youtube.com/watch?v=FaR2FxqDEvQ>> (accessed on 12 December 2025).

³⁸ *Malam* Misbahu Rabi'u Inuwa, Muslim scholar and occult practitioner (interview with Dahir Lawan Mu'az, Kano, December 2024). Social anthropologist Roy Dille, speaking of the Fulbe context of Futa Toro (Senegal), sees the termite mound as a symbol of traditional Fulbe 'caste knowledge', opposed or complementary to the mosque, symbol of Islamic knowledge (Dille 2004). This distinction does not seem relevant, however, in the context under discussion here. The termite mound – it should be noted – is a more generic symbol of social cohesion: Fulbe pastoralists, on special occasions, ritually feed their cows salt mixed with soil from termite mounds, which is believed to create in-group solidarity in the herd (Fulbe pastoralists, interviews with Andrea Brigaglia, Shanono, Nigeria, 2023).

To illustrate the *bugu* process, we interviewed a Sufi scholar of Kano, *Malam* Misbahu Rabiū Inuwa, who illustrated for us an example of extraction known as *aham^{un} zayy^u* (Fig. 12). *Malam* Misbahu explained that *aham^{un}* refers to a powerful, secret (but, in fact, quite well-known as it widely circulates in Sufi literature) name of God used in Sufi litanies, while *zayy^u* is an alphanumerical code that represents the number 17, which serves as the starting point for deriving this specific formula. The number 17 is derived by combining the numerical value of the letters composing the word *Allāh*, through a different procedure,³⁹ with the number of the five greatest prophets (*ūlū al-‘azm*): Noah, Abraham, Moses, Jesus, and Muhammad. Following this introductory explanation, *Malam* Misbahu proceeded to perform a series of multiplications and additions using the sand tablet. The medium of the sand facilitates rapid deletion and addition, as evident in the video recording of the procedure.⁴⁰ The instantaneous erasability of writing on sand also guarantees that the procedure remains essentially esoteric. The first step followed by *Malam* Misbahu involved a multiplication by 63, which is the figure that represents the age of Prophet Muhammad upon his death. By combining 6 and 3, he also obtained 9, which he referred to as the *kulki* (literally, in Hausa, ‘blackjack stick’, but in this context: ‘multiplier’) of the whole formula. He then continued with a series of multiplications, until arriving at the number 61,738,213,451, which corresponds to the ‘supreme divine name’, *aham^{un} saqak^{un} ḥala^{‘un} yaṣ^{un}*.

39 Normally, the number corresponding to the four Arabic letters of the name *Allāh* (ﷲ) should be 66 (1 + 30 + 30 + 5). However, according to an alternative numerological method, the two zeroes of the two thirties are removed and the calculation becomes 1 + 3 + 3 + 5 = 12.

40 To respect the esoteric nature of the procedure, we have omitted some sections from the recording. The partial video recording – which nevertheless offers a sense of the complex mathematical calculations involved – is available at <<https://www.youtube.com/watch?v=oPkLouAsI74>> (accessed on 12 January 2025).



Fig. 12: The sand tablet being used in *bugu* occult practices.

4.3 *Khaṭṭ al-raml*

As the Kano specialists of geomancy we contacted, *Malam* I. H. and *Malam* A. U., did not agree to a video recording, we have chosen to illustrate this practice through a page of the Hausa book *al-Raml wa-l-ashkāl idhā nazala al-rif'a al-āliya* (Fig 13), in which part of the procedures are explained by Ibrahim Mukarram Baba, son of Salih Abubakar Husaybakar (d. 2008). The latter was considered one of the foremost specialists of the Islamic *'ulūm al-asrār* (occult sciences) in Kano at the turn of the century.⁴¹ In brief, *khaṭṭ al-raml* works by forming with the right finger on the sand tablet sixteen random rows of one to twelve dots. Each row is then reduced to a one-dot or two-dot row, depending on whether the number of dots in each row is, respectively, odd or even. This leaves the practitioner with sixteen one-dot or two-dot rows, which, through a process of reversion, are combined into four figures, called 'mothers', and associated to certain divinatory meanings that involve numerous

⁴¹ While being well integrated in the established scholarly circles of Kano, Husaybakar became famous as a prolific writer of 'popular' literature on occult Islamic practices. Hunwick and O'Fahey (eds) 1995, 313–314, offers a partial list of his writings. An author of the present contribution is in process of documenting more of his writings.

astrological insights. The four ‘mothers’ are then reduced and recomposed again to form four ‘daughters’ and, successively, four ‘nieces’. The practitioner then interprets the resulting set of twelve figures, always combined with astrological and alphanumerical insights, as signs related to specific aspects of the petitioner’s future.



Fig. 13: Geomancy illustrated in the text *al-Raml wa-l-ashkal* by Ibrahim Mukarram b. Salih Baba Husaybakar.

5 Metallic tablets

The *allon karfe* (literally, in Hausa, 'iron tablet', but also indicating tablets in brass, aluminium, silver, and even gold)⁴² is used, similarly to the talismanic wooden tablet (*allon sha*), by writing on its body a talismanic recipe, often containing a *hatimi*. However, to achieve the desired effect, instead of being washed off and drunk, in this case the writing is warmed under sunlight or upon fire embers (Fig. 14). The *allon karfe* is widely used in occult practices, especially when a strong and immediate effect is desired on the intended person, whether to benefit or harm them. Although the metallic tablet is not *necessarily* used for harmful talismanic recipes, this tends to be the case quite often.⁴³

To understand the logic behind using the iron slate, we again consulted the Kano-based specialist *Malam* Misbahu Rabi'u Inuwa. He explained that achieving the powerful impact of a talismanic practice depends not only on the formula used (Qur'anic verses, alphanumeric 'seals', God's secret names, etc.) but also on aligning the writing practice with one of the four primordial elements – air, fire, earth, water – that the practitioner sees as dominant in the 'natural temperament' (H *dabi'a*) of the person that the ritual is designed to affect. This dominant element, in turn, is calculated at the beginning of the petition through specific calculations that combine the numerical value of the person's name with that of their mother's name. If this calculation shows that the dominant element in the person's temperament is air (AR *hawā'i*), paper may be used to enhance the spiritual impact of the formula, and the paper might be hung and exposed to air currents before use. If the dominant element is earth (AR *turābī*), a wooden slate is preferred. For a water-natured individual (AR *mā'i*), the written amulet may, for instance, be tied to a stone and placed in a river for some time, before being untied and used. Finally, for a person whose nature is dominated by the element of fire (AR *nārī*), the metallic slate is the most effective one. Different metals, however, also have different properties, so practitioners, by getting numerological or astrological insights on the person, may also decide on a particular metal among the range of options available: iron, aluminium, brass, silver, gold.

⁴² For a selection of samples of brass *allon karfe* from northern Nigeria, see Brigaglia and Pezzoli (eds) 2021, 202–209.

⁴³ The association of the metallic slate with a harmful intent cannot but remind one of the 'curse tablets' of Euro-Mediterranean antiquity (see Kotansky 1994), usually in lead. It is worth mentioning, however, that some specialists have recently started to question whether some of the ancient Greek 'curse tablets' might not, in fact, have had a protective intent (Faraone 2021).

The metallic slate, thus, may ‘tune’ a talismanic recipe to a recipient who has a fire-dominated natural temperament. Practitioners – continued *Malam* Misbahu – may also choose to concentrate their ‘tuning’ efforts on the *content* of the recipe, rather than on its recipient. In this case, the metallic slate will be chosen when the formula being used (a Qur’anic verse or chapter, or simply a divine name) is considered to have a ‘fiery’ nature. This is true especially of the formulas that mention God’s anger and punishment: their effect, especially in talismans meant to harm individuals (for instance, aiming to protect a house by hurting would-be robbers, or aiming to kill an enemy in battle), is believed to be intensified if written on a heated *allon karfe*. For instance, Q5:64 (‘every time they kindled the fire of war, God extinguished it’) is commonly used as protection and to counter adversaries. For rituals aimed at repelling enemies and for defence against malicious magic (AR *sihr*), the text of *sūrat al-Masad* is used: Q111, ‘May the hands of Abū Lahab⁴⁴ perish, and may he perish too! | No profit to him from all his wealth and his gains! | Burnt will he be in a fire of blazing flame! | And his wife, the firewood-carrier | On her neck will be a twisted palm-fiber rope!’

The texts to be featured on an *allon karfe* may be written in their entirety or, more often, ‘synthesised’ in an alphanumeric seal (*hatimi*). Fig. 15 shows a talisman drawn on a silver *allon karfe*. The talisman is based on a formula for *mal-lakar mutum* (‘reducing a person under one’s own control’). In the Hausa context, these formulas are often made for a jealous wife who wants to take her husband under her control and remove him from the control of a younger co-wife; but they may be equally used for a man who wants to control a woman, an employee who want to take control of their employer, and so on. The seal is derived from the numerical value of the letters that compose the Qur’anic verse Q85:12 (*inna baṭṣa rabbika la-šadīd*, ‘And the violence of your Lord is, indeed, stern!’), combined with the numerical values corresponding to the name of the petitioner and the name of the person targeted by the recipe.

⁴⁴ Abū Lahab is a paternal uncle of Prophet Muhammad and an archenemy of the latter’s community. His name means ‘Father of Flame’, so this Qur’anic *sūra* curses him using a pun on his name.



Fig. 14: A silver *allon karfe* being heated on charcoal embers in the house of *Malam* Misbahu Rabi Inuwa.

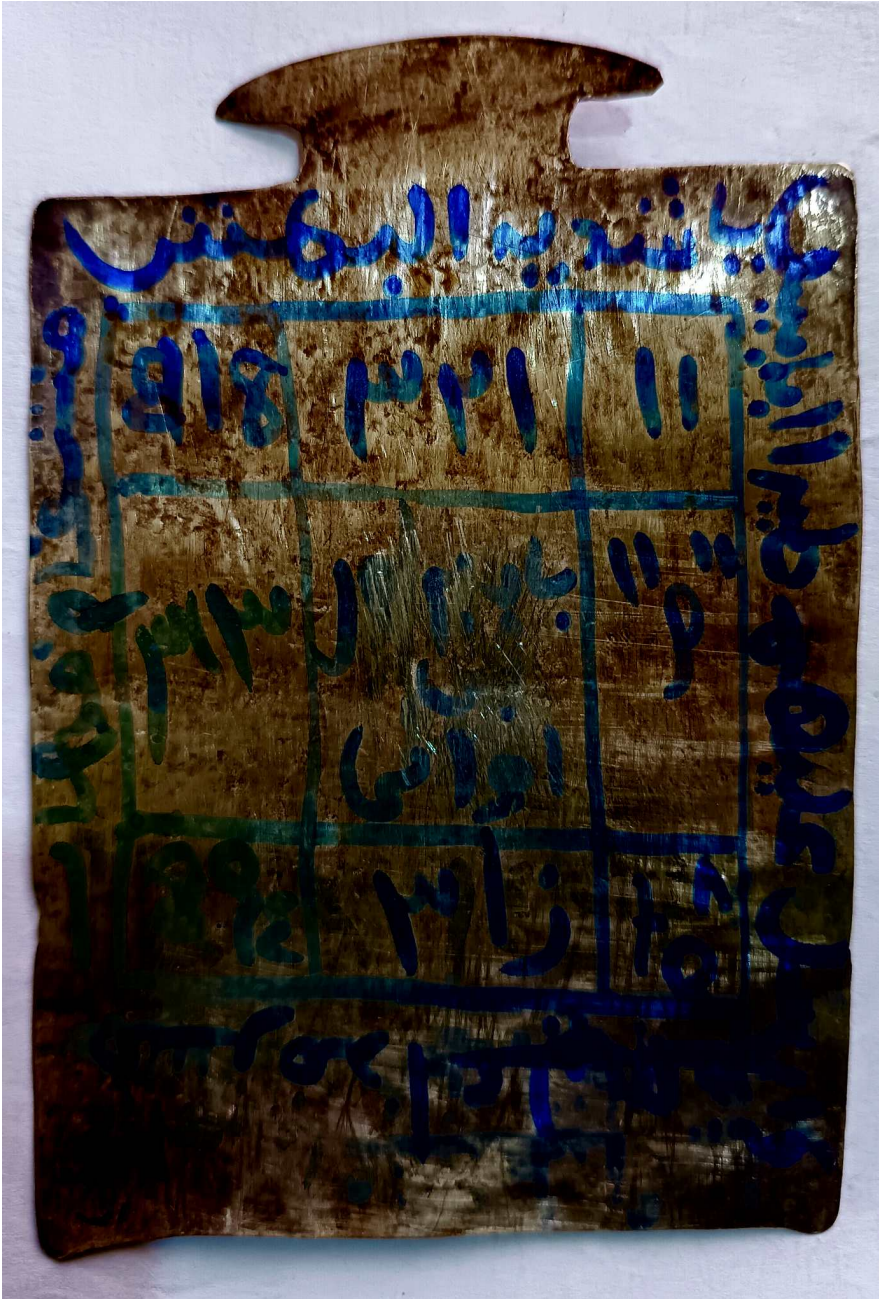


Fig. 15: A silver *allon karfe* with a talismanic seal (*hatimi*).

6 Conclusions

This article has provided an overview and discussion of erasable writing practices for inscribing and deleting transient texts on three different supports – wood, sand, and metal – within the context of northern Nigerian Islam. The described practices have a long history and are obviously rooted in premodern writing techniques. It would be wrong, however, to believe that their persistence is the fruit of a mere ‘traditionalist’ attitude. Some of these techniques continue to be preferred for technical-practical reasons. In these cases, a functional analysis that takes into account the internal goals of the techniques in question reasonably explains their persistence in an epoch when paper (not to mention electronic supports) is easily available. For instance, wooden tablet use in the *tsangaya* as a support for Qur’anic teaching is rooted primarily in the fact that the wooden tablet maximises concentration, minimises distraction, and teaches calligraphy, which are essential aspects of a pedagogy primarily aimed at achieving memorisation and developing writing skills. Similarly, the use of the sand tablet in *larabi* is associated with a practical, pedagogical goal: this tablet, as we have observed, allows the students to shift their focus from the oral teaching of a *matn* (textbook), which is aimed at simply being understood, to a list of bullet points (or to the figure resulting from a mathematical calculation) that, on the contrary, is to be memorised. In this case, the sand tablet may be easily, and quite naturally, substituted with modern erasable tools like whiteboards, as noted in at least one example above.⁴⁵

In some of the occult practices that we have observed, too, the use of a traditional support is functional to ensure easy erasability. The talismanic wooden tablet (*allon sha*), for instance, allows the writing to be washed off and drunk as healing or protection. However, as water-resistant paper is now relatively easily available on the market, it can stand-in for the *allon sha*. As we have documented above, moreover, the shift to water-resistant paper can trigger a series of new adaptations – such as the use of stamps for block-printed amulets, and the use of ink cartridges for printing computer-typed talismans – that may not only safeguard, but even increase, functionality.

Other instances of occult practices of writing and erasing transient texts reviewed in this paper, however, are based on a symbolic logic that associates a specific material support (wood, sand, metal) to the goals of the writing itself. In these cases, a functionalist analysis needs to be complemented by insights from

⁴⁵ See Section 4.1.

the anthropology of religion that take into account the symbolic logic of the practices observed. The use of sand in *bugu* practices, for instance, cannot be explained simply by the fact that the easy erasability of writing on sand is functional to maintaining secrecy: sand can, indeed, be wiped off quickly, leaving no trace of the procedure followed; the same erasability, however, can be achieved in principle by a whiteboard (just like in *larabi*), maintaining secrecy. In this case, the use of sand *as such* makes sense only when seen as intricately embedded in a web of symbols that link the goals of the practice of writing-erasure, its material support, and the various forces that animate the natural world. When adaptations do occur (as we have documented in the case of sand from an anthill or the burrow of a fennec fox), they are prompted by the symbolic logic of the occult, and not by functional considerations. Similarly, the use of metallic supports (the *allon karfe*) is ultimately embedded in the belief that metals embody a specific type of force – this belief, in turn, depends on an overarching, ubiquitous theory of the ‘four elements’ (fire, water, air, sand) and the ‘four qualities’ (hot, wet, cold, dry). Changing the writing support from metal to a different one would, thus, undermine the very logic on which the practice is based.

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Abbreviations

AR = Arabic
 H = Hausa
 Q = Qur’an
 SN = Scientific name

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Writing and Rewriting Wooden Tablets in Seventh- and Eighth-Century Japan: The *Mokkan* Used for Learning

Abstract: The paper focuses on Japanese wooden tablets (*mokkan* 木簡), which represented the most relevant reusable medium in ancient Japan (seventh–eighth centuries CE). Indeed, the softness of certain wood types allowed these tablets to be easily smoothed and reused multiple times, until they became too worn and were transformed into thin sheets. By examining the tablets as physical objects, the paper aims to uncover how their material properties and the reuse potential of wood provided unique opportunities for learners, and to shed light on the cognitive mechanisms involved in mastering complex writing systems such as the Sinitic script.

1 Introduction

In the seventh and eighth centuries, Japan was a highly centralised bureaucratic state that had recently adopted writing technology. Within just a few decades, it managed to catch up with the continent's expertise and produced a vast repertoire of documents.

In this centralised state, an officialdom, well trained in writing, reading, and copying, facilitated an intensive flow and interchange of information, leading some scholars to refer to it as an 'administration by the use of written documents'.¹

Various materials were used for writing: wooden tablets and paper were widespread, while silk and lacquer had more specialised applications. There was also limited use of stone, metals, pottery, and bamboo, but no evidence of that of clay, wax, or parchment.² Both wooden tablets and paper are writing tools and media that Japan adopted from China, along with the writing system itself and

¹ Mesheryakov 2003, 187. For an extensive study on literacy in ancient Japan, see Lurie 2011.

² A general introduction to Japanese writing supports is Tōno Haruyuki 2005. Specifically on the use of paper, see Tōno Haruyuki 1977. On the large corpus of paper documents preserved at the Shōsōin, see Sakaehara Towao 2011 and Lowe 2017.

many related cultural elements. The most commonly employed supports were also the most reusable ones.

In this paper, I focus specifically on wooden tablets, called *mokkan* 木簡 (literally ‘wooden slips’) in modern Japanese, which serve as examples of a reusable medium. Due to the softness of certain wood types, these tablets could be easily smoothed and reused until they became worn out, after which they were transformed into thin sheets.

The reusability of wood that can easily be scraped and reinscribed is well known, but for the sake of this volume, I would like to focus on the relationship between the reusability of this particular and widely used support, the technology of writing, and the process of learning, as evident in a corpus of ‘tablets for writing practice’ (called *shūsho mokkan* 習書木簡 in Japanese scholarship). The erasability of *mokkan* has been highlighted by David Lurie,³ while the use of wooden tablets for writing practice has been studied by various Japanese scholars;⁴ among them, Inoue Miyuki has highlighted how the content of these artefacts, particularly the inscribed characters, can illuminate some cognitive processes underpinning learning.⁵ Some previous studies have focused on analysing the inscriptions to understand these mechanisms. However, this study seeks to broaden the scope of enquiry by shifting the focus from the content of the inscriptions to the physicality of the tablets themselves. I argue that these wooden tablets were not merely passive vehicles for recording characters; rather, they played an active role as ideal instruments for practising Sinitic script. By examining the tablets as physical objects, this contribution aims to uncover how their material properties and the reuse potential of wood provided unique opportunities for learners, thus offering valuable insights into the cognitive mechanisms involved in mastering complex writing systems.

This paper is therefore structured into three main parts. While certain aspects of *mokkan* production are well documented in Japanese-language studies, in order to enhance accessibility for readers unfamiliar with the Japanese manuscript culture, I first provide a brief introduction to wooden tablets in ancient Japan, including details of their discovery and their main types. Next, I delve into the technical aspects of reusing tablets, highlighting the methods employed to render them reusable. Finally, I focus on educational settings, presenting and discussing

3 Lurie 2011, 160–162.

4 See Tōno Haruyuki 1983, 167–183; Tōno Haruyuki 1990; Tōno Haruyuki 2003; Satō Makoto 1997, 429–465; Satō Makoto 1999, 170–177; Satō Makoto 2006; Arai Shigeyuki 2006; Watanabe Akihiro 2009; Inoue Miyuki 2017a; Inoue Miyuki 2017b.

5 Inoue Miyuki 2017a; Inoue Miyuki 2017b.

specific tablets that were used and reused for learning purposes, identifying distinct cognitive processes facilitated by reusable wooden surfaces.

Direct access to *mokkan* is not possible. Due to their high moisture content, exposure to the air upon unearthing results in rapid drying and subsequent deterioration. After excavation, the tablets are immersed in a dilute solution of boric acid and borax to prevent corrosion. After gentle cleaning with a soft-bristled brush and subsequent recording and textual analysis, the published wooden tablets are carefully stored in water in a usually restricted storage room.⁶ Therefore, the manuscripts examined in this paper are all extracted from the freely available online Mokkanko – Wooden Tablet Database operated by the Nara National Research Institute for Cultural Properties, which consists of a corpus of around 57,000 tablets.⁷ Fortunately, Mokkanko provides digitisation of the fragile wooden tablets in high definition, capturing details beyond direct observation and enabling advanced research while reducing the need for physical handling.

2 What are *mokkan*?

Mokkan are, by a simple definition, ‘documents written down by use of ink on wooden slips of varying size, usually not very big’.⁸ Japan imported the use of wooden tablets from northern China, but, unfortunately, no surviving sources describe the production of *mokkan* in the ancient period.

The wood on which the slips are carved is mainly Japanese cypress (*hinoki* 檜, *Chamaecyparis obtusa*) or Japanese cedar (*sugi* 杉, *Cryptomeria japonica*). Other coniferous and some deciduous woods are also occasionally used. Either way, Japanese cypress and Japanese cedar are two native tree species that were, and still are, widespread throughout Japan. Both types of wood are favoured for their softness, which makes them easy to work with, as well as their resistance to

6 The condition of the tablets is evaluated approximately once a year. Baba Hajime 2023, 33; Wakiya Sōichirō 2010.

7 The Mokkanko database is available at <<https://mokkanko.nabunken.go.jp/>> (accessed on 6 January 2025). On the history of the database and some issues in the digitisation of *mokkan*, see Baba Hajime 2023.

8 Tōno Haruyuki 1983, 4. For a general introduction to *mokkan*, see Kitō Kiyooki 1984; Ōba Osamu (ed.) 1998; Satō Makoto 1997; Tōno Haruyuki 1977; Tōno Haruyuki 1983; Tōno Haruyuki 1997; Tōno Haruyuki 2005; Ishigami Eiichi, Katō Tomoyasu and Yamaguchi Hideo 1999. For remarks in English, see Farris 1998, as well as Piggott 1990; Van Goethem 2006; Manieri 2020; and Frydman 2023.

mould, insects, and weathering. The extant wooden tablets were preserved in a stable underground environment, guaranteed by the presence of abundant groundwater.⁹

The wooden tablets are inscribed, but never incised. The ink used is called *sumi* 炭, which consists mainly of three elements: (1) soot made by burning oils such as tung oil (*tōyu* 桐油, *Aleurites fordii* or *Vernicia fordii*), soybean oil, or wood such as pine; (2) animal glue; and (3) sometimes scents such as incense or medicinal herbs. This mixture was kneaded and then hardened. The resulting ink stick had to be ground up and dissolved in water before use.

Very few *mokkan* had come to light before 1961, the year when the first large corpus of wooden tablets was unearthed at the site of Heijō Palace in Nara. From that date onwards, around five hundred sites throughout the country, from northern Honshū to Kyūshū, have yielded approximately 470,000 exemplars from many different periods, especially from 700 to 800 CE, with a few examples dating to the mid seventh century.¹⁰

Around three-quarters of the *mokkan* come from Nara, but a significant number also come from the surrounding regions of other former capitals, such as Fujiwara, Nagaoka, and Heian; from the headquarters of certain provinces; and from Buddhist monasteries. In other words, areas of power with an advanced level of literacy. Some *mokkan* preserve only a few readable characters, while others contain texts that add substantially to what we know from paper documents.

Mokkan come in a variety of shapes and sizes, showcasing a diversity not seen in their Chinese counterparts.¹¹ Scholars at the Nara National Research Institute for Cultural Properties have elaborated a taxonomy of surviving tablets based on their shape: of the fifteen identified types, two of the most common are long strips with square corners, while others feature pointed ends or indentations that allow them to be attached to goods as tags. Most are unfortunately illegible fragments.¹²

9 Many fragments and shavings have been found in what are supposed to be the latrines of the administrative complexes. These tablets were found to contain organic materials traceable to human faecal residues, indicating that, even after becoming too thin to serve as writing surfaces, they were repurposed one final time as ‘toilet paper’: a remarkable example of concern for resource conservation, and of ancient recycling taken to its fullest extent (albeit not exclusively in the sense intended by this volume)!

10 On *mokkan* falling into disuse in favour of paper documents, see Imaizumi Takao 1994.

11 Farris 1998, 201.

12 A picture representing the fifteen shape types of *mokkan* is always included in *Mokkan kenkyū* 木簡研究, the journal of the Mokkan gakkai 木簡学会, an academic society dedicated to

In terms of their content, *mokkan* can be classified into three major types: labels or tags, which were attached to tax goods such as dried fish or seaweed, bales of rice, iron, cloth, and so on; documents in the strict sense, on which officials wrote all sorts of memoranda, notes, public documents, dispatches of men and materials, and so on; and slips for calligraphy practice and for studying.

As stressed by Joan Piggott, ‘*mokkan* are different from most documents preserved on paper. Unlike the paper record, they were never meant to serve as a formal witness to contemporary events’.¹³ Nonetheless, they have significantly contributed to our knowledge of administration, material culture, and the movement of goods, supplementing the information derived from paper documents. Besides being precious artefacts, *mokkan* are also now fundamental sources for the reconstruction of historical fields dealing with everyday life and transactions.¹⁴

3 Technological aspects of reusing wooden tablets

In this section, I examine various aspects of the tablets’ reusability, exploring the progression from raw wood to tablet, from an unused tablet to an inscribed one, and from an inscribed tablet to a reused one, while also considering the by-products of this reuse, specifically the shavings. To gain a comprehensive understanding of this process, it is essential to elucidate the technical attributes of the tablet as a medium for reuse, along with the tools that facilitated this process, such as brushes and knives.

3.1 Production of tablets

As far as the production of wooden tablets is concerned, we can rely only on the reconstructions of scholars. A milestone in the field of *mokkan* as archaeological objects and their materiality is an early study by Yamanaka Akira, who has

the study of ancient wooden documents. The image is also available from Mokkanko <https://mokkanko.nabunken.go.jp/ja/?c=how_to_use> (accessed on 6 January 2025).

¹³ Piggott 1990, 451.

¹⁴ In a recent contribution, Paula Curtis (2024) has shown how replicas of *mokkan* can be effectively employed in object-based teaching of premodern Japanese history. Through physical interaction with historical sources, students not only engage in metacognitive reflection but also overcome preconceived notions regarding the legibility of artefacts with textual content.

demonstrated that label tablets from the districts exhibit commonalities at the village level, while those produced in the capital area show commonalities at the office level. These commonalities were not limited to calligraphy and style but also evident in the physical aspects of the tablets under investigation, such as the methods of cutting and splitting. Tablets were not prepared in advance and distributed; instead, they were produced directly in the villages, households, and offices responsible for their content. In other words, officials did not simply take ready-made tablets and inscribe them; rather, they were involved in the production process itself, which involved three steps for mass-producing tablets: cutting long strips from boards by moving the blade orthogonally to the timber grain or splitting the strips by moving the blade along the grain; folding the strips using arm strength to reduce them to smaller individual tablets; and smoothing the tablets down to create a flat surface.¹⁵

Therefore, as we shall see below, knives were of primary importance in producing the tablets, serving both for cutting and shaping. The wooden strip could also be further shaped to create a pointed lower end or a shaped upper end, needed to tie a string to.

3.2 The desk of a *mokkan* scribe

Once the tablet was produced, it went to the official's desk. The Nara National Research Institute for Cultural Properties has reconstructed the tablet scribe's desk based on archaeological data.¹⁶ In addition to the wooden slips, the desk includes a brush, usually with a bamboo or wooden handle tipped with animal hair; an ink stick; an ink stone (*suzuri* 硯, or in eighth-century sources 研) made of Sue 須恵 ceramic, used to grind the ink stick into powder;¹⁷ a water dropper, called *suiteki* 水滴, also made of Sue ceramic, for replenishing the water in the ink

¹⁵ Yamanaka Akira 1992.

¹⁶ The reconstruction of the desk can be viewed as a permanent exhibition in the Government Office Reconstruction Display Room at the Nara Palace Site Museum (Nara Palace Site Historical Park) and in the Nara Prefecture Complex of Man'yo Culture (Asukamura, Nara Prefecture). See also Nara bunkazai kenkyūjo 2010, 10.

¹⁷ Ink stones and water droppers were typically made of ceramic, specifically Sue ware. Ink stones exhibit a variety of shapes, ranging from simple round slabs to more elaborate forms, including those resembling birds and sheep. However, numerous ink stones unearthed in Nara are shaped like inverted bowls, and actually could have originally served as bowls before being repurposed. Additionally, several jar shards discovered in Nara were similarly adapted for use as ink stones. For a discussion of ink stones, see Nara bunkazai kenkyūjo 2006; Nara bunkazai kenkyūjo 2007b.

stone, necessary to dissolve the ink; and a penknife, called a *tōsu* 刀子, which is a small knife used to scrape the surface of a wooden tablet to erase the writing on it. Other occasional tools included metal or wooden seals and counting rods, which were small bars, typically 3 to 14 cm long, used for calculation in East Asia.

The *tōsu* penknife was undoubtedly the most significant tool among these implements for making a wooden slip usable and reusable. The fact that the penknife was an essential tool in the work of the scribe and, more generally, of the writer is attested by a phrase used to describe the activities of copyists, *tōhitsu* 刀筆, which means ‘knife and brush’.

An early mention of this term can be found in a memorial to the sovereign issued in 757 by the Great Council of State (Daijōkan 太政官), recorded in the *Shoku Nihongi* 続日本紀 (*Chronicle of Japan, Continued*, 797), Book 20, Tenpyō hōji 1 (757).12.9:

正五位上大和宿禰長岡・從五位下陽胡史真身、並養老二年修律令功田各四町。外從五位下矢集宿禰虫麿・外從五位下塩屋連吉麿、並同年功田各五町。正六位上百濟人成同年功田四町。五人、並執持刀筆、刪定科条。

Yamato no Sukune Nagaoka, senior fifth rank, upper grade, and Yako no Fuhito Mami, junior fifth rank, lower grade, [are both owed] 4 *chō* [1 *chō* = c. 0.9917 ha] of merit rice fields each for compiling penal and administrative codes in the second year of the Yōrō era [718]. Yazume no Sukune Mushimaro, outer junior fifth rank, lower grade, and Shioya no Muraji Kichimaro, outer junior fifth rank, lower grade, [are both owed] 5 *chō* of merit rice fields each in the same year. Kudara no Hitonari, senior sixth rank, upper grade, 4 *chō* of merit rice fields in the same year. All five of these officials, *holding a brush and a knife, amended the rules and the articles*.¹⁸

The memorial aimed to record the rice fields granted to officials who had performed meritorious deeds. The five officials entrusted with amending the penal and administrative codes are specifically described as ‘holding a brush and a knife’. This expression emphasises that it was not only necessary to be skilled in using a brush, but also in handling a knife.

Examples of penknives used for writing have been preserved as archive objects and as artefacts yielded by archaeological discoveries.

Some highly valuable knives are now preserved at the Shōsōin 正倉院 repository, the storehouse of the Tōdai 東大 monastery in Nara, now under the supervision of the Imperial Household Agency. These feature handles crafted from materials such as ivory, dark-coloured or mottled rhinoceros horn, amber, black stone,

¹⁸ Aoki Kazuo et al. (eds) 1992, 242. My emphasis. All translations from Japanese to English are mine, unless otherwise noted.

muku 棕 (*Aphananthe aspera*), black persimmon, red sandalwood, or Japanese apricot tree wood; and sheaths made of *muku*, black persimmon, jujube wood, bronze, *bachiru* 撥鏤 (engraving design motifs on the dyed surface of the ivory), tortoiseshell, water buffalo horn, rhinoceros horn, gilded silver, or lacquer. Both handles and sheaths are often adorned with tree bark, bronze, silver or gold fittings, gemstone decorations, or mother-of-pearl inlays.¹⁹

However, simpler and more affordable *tōsu* knives made of iron, probably with wooden handles, have been excavated at various sites, often in the proximity of tablet mounds, such as artefact J-596, found at Netsu, Nagano Prefecture, and now preserved at the Tokyo National Museum.²⁰

3.3 The product of scraping: Shavings

The items in the Shōsōin collection and the carving penknives discovered at several archaeological sites are not the only evidence for the scraping of wooden tablets. The most tangible proof comes from the wood shavings (*kezurikuzu* 削屑) found in almost all tablet mounds.

These shavings, which demonstrate their resistance to moisture and water, represent 80 per cent of the total repertoire and show that the erasure and reuse of *mokkan* did indeed occur in ancient Japan.

Moreover, these shavings should not be confused with *mokkan* fragments (usually referred to as *saihen* 細片 in Japanese), which are the result of crumbling or a more incisive cut that is not a simple scraping and is not intended to ‘clean up’ the tablet for reuse.

Inscribed shavings hold particular significance as evidence of reuse. Some of these shavings exhibit further recycling of materials, bearing inscriptions on both sides.²¹ This dual-sided use underscores the resourcefulness and practicality of wood use, reflecting broader practices of preservation and character training, as is elaborated upon later in this paper.

¹⁹ The numerous penknives preserved at the Shōsōin can be consulted in the Shōsōin Treasures Database at <<https://tinyurl.com/dtkebe84>> (accessed on 6 January 2025).

²⁰ See the image of Tokyo National Museum, artefact J-596 in ColBase: Integrated Collections Database of the National Institutes for Cultural Heritage, Japan, <https://colbase.nich.go.jp/collection_items/tnm/J-596?locale=ja> (accessed on 6 January 2025).

²¹ See the examples via Mokkanko at <<https://mokkanko.nabunken.go.jp/ja/5BASNI33000399>> or <<https://mokkanko.nabunken.go.jp/ja/5BASNB32000666>> (accessed on 6 January 2025).

3.4 The reasons for scraping

In general, tablets were scraped for three main reasons. The first, intuitive one is the immediate correction of material errors. Another reason is the updating of data. For example, the various *mokkan* and shavings related to the evaluation and promotion of officials, unearthed at sites such as SD4750 and SD1525, in the correspondence of the residence of Prince Nagaya 長屋 (684–729), as well as at the SD4100 site, at what must have been the headquarters of the Ministry of Procedures (Shikibushō 式部省), fall into this category. In this case, each *mokkan* functioned as a sort of personal file, with more or less stable data, such as family name, personal name, and family register (*koseki* 戸籍), along with other variables such as age and, above all, an indication of rank and office, as well as any changes in this status since the previous year. To update this personal file, it was sufficient to scrape away the information that needed to be changed with a pen-knife, and then rewrite it.²²

Finally, because wooden tablets were not usually meant for long-term preservation, they were scraped clean to allow for new inscriptions once the original message was no longer needed. For instance, after serving as a label accompanying tribute from the province to the capital, a wooden tablet could be reused for other purposes. Tablets were inscribed with new content, which could be analogous to the previous content or not.

When used for practising characters, there were two slightly different forms of tablet reuse: tablets previously used for documents or labels were scraped and repurposed for character practice, while tablets specifically designated for practice were reused for repetitive writing exercises and memorising characters. In both scenarios, the tablets were used for learning and practice and never intended for preservation.

From this point on, I focus on these ‘tablets for writing practice’ in order to show the correlation between tablet reuse and writing technology.

²² Nara bunkazai kenkyūjo 1986, 13–38. A simpler presentation is in Nara bunkazai kenkyūjo 2018, 118–121.

4 Using and reusing wooden tablets in educational settings

Having examined the material aspects of reusing wooden tablets, I now turn to illustrating the deliberate use of wooden tablets as a reusable medium for writing and, consequently, as a preferred learning tool.

In my opinion, there are two primary reasons for the preference of wooden tablets over paper: first, their reusability helps to minimise the waste of paper associated with what is inherently a transient activity; second, the Chinese writing system comprises an extensive number of characters, exceeding 50,000, which necessitates continuous practice and memorisation.

For clarity, it is important to note that, in the Chinese writing system, each grapheme consists of a specific number of strokes written in a prescribed order. Certain characters, referred to as ‘radicals’, cannot be further simplified and serve as components of other characters. When learning a new character, whether in ancient or modern contexts, the learner must understand the radical and stroke order, both of which are essential for memorisation.

The Mokkanko contains 2,414 out of 56,831 recorded items as tablets for ‘calligraphy practice’.²³ This is just over 4 per cent of the total.

These tablets were unearthed at a number of sites throughout the country. A significant proportion originate from the capitals of Asuka, Nara, and Nagaoka. Consequently, they span a temporal range from the late seventh century to approximately 794 CE, which marks the year of the capital’s relocation from Nagaoka to Heian. However, a large number of these tablets were also unearthed at various provincial office sites, as well as at Dazaifu (a sort of super-provincial body located on the island of Kyūshū), and at several monastery areas, including Yakushi 薬師 monastery in Nara, Kannon 観音 monastery in present-day Tokushima Prefecture, and Tajima Kokubun 但馬国分 monastery in present-day Hyōgo Prefecture. This evidence suggests that the practice had disseminated throughout all the cultural and power centres of the archipelago.

Following the taxonomy proposed by Watanabe Akihiro,²⁴ it is possible to distinguish between tablets containing texts or portions of a text that can be read as coherent texts, and those containing individual characters that do not form a

²³ Other categories, according to the content of the database, include Document, Tag, Shipping Tag, Voucher, Scroll Axle, Document Sealer, Wooden Utensil, Shogi Piece, Spell, Stupa-shaped Grave Marker, Sutra-inscribed Stupa Shape, Other.

²⁴ Watanabe Akihiro 2009.

complete text. The former can be further divided into those containing quotations from Chinese classics and legislation, phrase books, Japanese poems, and texts without a specific source. In the first group, tablets contain complete sentences or texts; in the second, they do not, rather providing a unique glimpse into the techniques used for learning and writing characters. This is why I focus on the latter group, which not only is less investigated but also more readily lends itself to the deliberate practice of reusing a tablet as a standard writing procedure, rather than due to any mechanical error necessitating erasure and rewriting.

5 Tablets for learning characters and words

This section presents five distinct types of wooden tablets used for learning practice, with a particular focus on the acquisition of characters. This analysis is based on tokens extracted from the Mokkanko – Wooden Tablet Database. I first introduce each source with regard to its material characteristics and textual content. Subsequently, I elucidate the characters targeted in the learning practice and discuss the features of the acquisition strategy employed.

5.1 Tablet with miscellaneous, unrelated characters

The first example under investigation comes from the *mokkan* no. 967, unearthed at excavation SK1153 at the Asuka Ike Site, North Section in Asakamura, Nara Prefecture.²⁵

This rectangular slip, made of Japanese cypress wood, was cut along the cross grain and measures c. 224 × c. 15 × 5 mm. The top edge is shaved, with visible cutting marks from before its final shaping, while the bottom edge is folded, and the left and right sides are split. Notably, the tablet, 5 mm thick, is heavily worn, which suggests extensive use over time.

On the recto, after a small blank space, there may be about thirteen characters inscribed in a line, of which six are readable, five may be marked as missing, and two are inferred.

On the verso, after a space for an unreadable character, the upper half has a double-line indented portion of text, followed by another line of unreadable char-

25 For the excavation report, see Nara bunkazai kenkyūjo 2007a. A photographic reproduction is available from Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/5BASNJ30000967>> (accessed on 6 January 2025).

acters. The indented section consists of two lines of partially overlapping writing, the right one with two readable and three missing characters, the left one with two readable and four missing characters.

The content of the *mokkan* is as follows:²⁶

R. ○具具皮□留无□各□□乃?□□受?□

○□□□夫秦
V. □ ○□□□□□
□□□夫○奉□

The characters inscribed, in the order of their appearance and accompanied by annotations concerning their meaning, are 具 ('tool', two occurrences), 皮 ('leather'), 留 ('to stay'), 无 ('to be without'), 各 ('every'), 乃 ('then'), 受 ('to receive'), 夫 ('husband'), 秦 ('Qin dynasty'), and 奉 ('to offer').

The characters in question do not exhibit any discernible link at the level of the graph, with the exception of some superficial similarities between the final two characters. Nor do they show any sound or semantic connection. Consequently, the characters have been assembled on the basis of their probable occurrence in a text that was either in progress or in the process of being copied.

5.2 Tablets with a single repeated character

The rest of the examples I analyse do not, however, present unrelated characters, but rather characters that are associated in some way.

The second example (Fig. 1) is *mokkan* no. 1141, unearthed at excavation SK1153 at the Asuka Ike Site, North Section.²⁷

²⁶ In this article, the following conventions are used for reproducing the inscription on the wooden tablet. R. and V. stand for 'recto' and 'verso', respectively, even in cases where it is not clear which of the sides is the front or back. The big circle ○ indicates a gap, or space with no writing, originally on the tablet; the small circle ◦ indicates the presence of a transverse hole in the tablet. Each square □ stands for a single missing character. A question mark ? placed to the right of a character indicates uncertainty about its reading. Text enclosed in 【 】 brackets runs in the opposite direction (i.e. upside down) from the rest. Linguistic data from Old Japanese follows Vovin 2020, and from Medieval Chinese, Baxter and Sagart 2014.

²⁷ For the excavation report, see Nara bunkazai kenkyūjo 1999, esp. 8. A photographic reproduction is available from Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/5BASNJ30000802>> (accessed on 6 January 2025).

It is a small shaving (another shaving of the same tablet is item no. 1142, unearthed at the same site), with eight characters, of which five are readable, one inferred, and two unreadable.

The text of the *mokkan* reads as follows:

□得得得得得□□

The single repeated character 得 is pronounced *tok* in Medieval Chinese and means ‘to obtain, to have, to own’, or is employed as a modal adverb indicating uncertainty, possibility, or a mild suggestion. Additionally, the character is employed in Old Japanese as a phonogram for the syllables *u* or *tə* and disyllabic *təkə*. The repetition of a single character multiple times over serves to illustrate how mechanical repetition was used as a pedagogical technique for acquiring characters.



Fig. 1: *Mokkan* no. 1141, shaving with a single repeated character; courtesy of Mekkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

From a cognitive perspective, repetition is an inevitable component of character acquisition. Even in the present era, the initial stage of education often entails rote learning of characters. It is evident that learners employ a plethora of memory techniques; however, to truly engage with the written character, use of a brush and tablet (or, in the modern era, a pen and paper) is required. The tactile experience of using the brush undoubtedly reinforced memorisation, and with continued practice, the process would become increasingly natural.

An interesting aspect of this type of slip is that some shavings scraped from the same tablet bear the same character and have been discovered at the same site. Of particular note is site SK514 26-D in Dazaifu, Fukuoka Prefecture, where a number of shavings bearing the same repeated character have been discovered. By way of illustration, the shavings designated nos 1-77, 1-78, 1-79, 1-80, and 1-81 all display the identical character 貳 ('two', a variant of 二 frequently used in legal documents), which is repeated twice in each of the aforementioned shavings, with the exception of 1-78.²⁸ Items nos 1-77 and 1-78 are composed of the same coniferous wood, while items nos 1-79 to 1-81 are made of Japanese cypress. This exemplifies the use of the same character on different tablets. The excavation report provides numerous examples of this type,²⁹ and it is noteworthy that this slip is evidence of writing practice in a peripheral office of the kingdom, such as the Dazaifu Office, which is situated near present-day Fukuoka.

5.3 Tablets with visually related characters

The following examples all concern tablets with characters that are related visually. In this regard, it is important to clarify that individual Chinese characters include components, known as 'radicals', that have individual meanings. Radicals are basic characters that cannot be simplified any further. They often define a broad category, giving either phonetic or semantic clues, and are also used as an index to classify other characters and words. Moreover, some characters that are not radicals can also be found within more complex characters; these are known as 'component characters', or simply 'components'.

²⁸ The Mokkanko database does not provide an image of the shavings, which can be found in the excavation report in *Kyūshū rekishi shiryōkan* 1976, 57.

²⁹ *Kyūshū rekishi shiryōkan* 1976, 57–61, 65–74.

The third example, *mokkan* no. 4688, was unearthed at excavation SD4100 at the Heijōkyū Miyashiro Tōnangū Site in Nara.³⁰

It is a rectangular item, made of Japanese cypress cut along the cross grain, measuring c. 235 × c. 29 × 5 mm, with upper incision, and secondary incision on the left and right sides. The item has readable characters on both sides: nine on one side and eleven on the other.

The text of the *mokkan* reads as follows:

R. 青青秦秦秦謹謹申

V. 謹論語諫計計課課謂誰

The recto appears to be an exercise in four different characters: 青 ('blue-black; green') and 秦 ('Hata (Pata) family'),³¹ both repeated three times; 謹 ('taciturn; respectful'), repeated twice; and 申 ('to state; to declare'), written only once.³² It therefore combines the two cases seen above: characters that do not necessarily have a link, are repeated several times, and are probably taken from a text to be copied, composed, or filled in.

The other side contains eleven different characters, sharing the same radical for 'speech' (number 149 in the modern classification), which is placed to the left of other elements: 謹 ('taciturn; respectful'); 論 ('statement'); 語 ('to tell'); 諫 ('to admonish'); 許 ('to allow'); 計 ('to formulate'); 課 ('examination'); 諄 ('to induce'); 謂 ('to say'); 諛 ('to judge'); and 誰 ('who?').

The fourth example (Fig. 2) is a long tablet with a rectangular shape, of Japanese cypress, cut along the cross grain, measuring c. 475 × 30 × 5 mm. It was unearthed at excavation SD4750 at the well-known Prince Nagaya's Residence, in Nara.³³

There are twenty-four characters interspersed with blank spaces on the recto, and twenty-three readable characters and two unreadable characters interspersed with blank spaces on the verso.

30 For the excavation report, see Nara bunkazai kenkyūjo 1967, esp. 19. A photographic reproduction is available via Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AAICJ59001091>> (accessed on 6 January 2025).

31 The character 秦 in Chinese is used for Qin (dynasty), but in Japan it can also be used to transcribe the family name Hata (Pata according to the Old Japanese reconstructed pronunciation).

32 The characters 謹申 are usually used in compound to mean 'I humbly declare'.

33 For the excavation report, see Nara bunkazai kenkyūjo 1990, esp. 15. A photographic reproduction can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6AFITD11000189>> (accessed on 6 January 2025).

Ten characters on the recto and eight on the verso run upside down as compared to the rest.

The text of the *mokkan* reads as follows:

R. 娘婚婚婚民眠暗暗暗○【婚】○婚○【受】○婚婚昏○【受号別】○受○【受受毆受受】

V. 婚婚婚婚婚婚娘娘□娘人○【娥】○娘○【娥】○娘妹妹○【毆】○妃婚□○【綬綬純純歲】

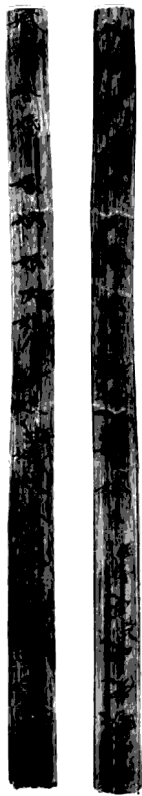


Fig. 2: *Mokkan* with visually related characters; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

Of the forty-seven token characters, we can identify nineteen types – in order of number of occurrences, indicated in brackets – as follows: 婚 ('marriage', 12), 受 ('to receive; to accept', 7), 娘 ('maid', 4), 暗 ('dull vision', 3), 純 ('silk thread all of one colour; pure; genuine', 2), 娥 ('slender', 2), 毆 ('to beat with a stick', 2), 娘 (a character used in female given name, 2), 妹 (a graphic variant for 夫, 'husband',

2), 綬 ('seal-ribbon', 1), 歲 ('year', 1), 眠 ('to repose', 1), 姤 ('to come across; to join with', and a variant for 妬, 'to be jealous', 1), 昏 ('dusk; benighted', 1), 別 ('to separate', 1), 妃 ('wife, spouse; imperial consort', 1), 民 ('commoner', 1), 号 ('to designate, to name', 1), and 人 ('person', 1).

Sorting out the logic of the inscription is not easy, but the following observations can be made.

First of all, although many characters appear to refer to the semantic domain of marriage, some are completely unrelated. Most of the characters written upside down appear unrelated to the rest of the text.

Second, some groups of characters have the same radical in the left position: 婚, 娘, 娥, 媛, 妹, 姤, and 妃 have the same radical 女 ('woman'); 昏 and 眠 have the same radical 目 ('eye'); 綬 and 純 have the same radical 糸 ('thread').

Third, some characters are a component but not the radical of another character: 民 is the right component of 眠 (whose radical is the left component 目); 受 is the right component of 綬 (whose radical is the left component 糸).

Furthermore, 昏 and 婚 have the same right component, 昏; and 受 and 綬 share the same component 又 (which is radical only in 受) with 毆, whose radical is 攴.

Finally, 号 resembles the left component of 別.

To sum up, although some characters share the same radical, it seems that, unlike the previous tablet, this one focuses on the similar appearance of the characters or the sharing of an element that is not necessarily the radical. Accordingly, the learning technique prioritises visual memorisation, encompassing not only the radicals that facilitate the classification of characters but also the elements that prove challenging for learners and warrant specific attention.

The same type of exercise or learning process is observed in numerous shavings. Here, I will limit the examination to two examples. The first item is a shaving unearthed at excavation SD5100 at the Nijō Ōji Site in Heijōkyō (Nara), which reads as follows:

紫袋紫袋紫袋○袋

An alternation can be observed between 紫 ('purple') and 袋 ('sack'), which do not share the same radical but may exhibit some resemblance that could lead to con-

fusion. This is not the only shaving from excavation SD5100; there are fourteen others with similar characteristics.³⁴

The second shaving under investigation was found at excavation SD5300 at the Nijō Ōji Site. It reads as follows:

○□遣還
□○還○還○□

Here, the two characters 遣 ('to dispatch') and 還 ('to turn round') indeed share the same radical of 辵 ('walk') (or 辵, number 162 in the modern classification). In this case, the shaving is part of a much larger repertoire, comprising over one thousand shavings, many of which contain a single repeated character.³⁵ This illustrates how the reuse of wooden tablets was particularly prolific.

5.4 Tablets with disassembled characters

The pertinent example in this section (Fig. 3) is shaving no. 3692, unearthed at excavation SD4750 at Prince Nagaya's Residence.³⁶

The shaving's text reads as follows:

寺寺寺十一寸時

The shaving contains seven characters. The first three are the same, 寺, which means 'monastery'. Although the first instance is not fully legible, it can still be easily recognised. The subsequent three characters are 十 ('ten'), 一 ('one'), and 寸 ('inch'). All three are in fact components of the character 寺 ('monastery'), whose radical is 寸.

The seventh character 時, meaning 'time', contains the character 寺, adding a further component, namely 日, the radical for 'sun'.

³⁴ For the excavation report, see Nara bunkazai kenkyūjo 1997. A photographic reproduction of the shaving can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AFIUOZ0006548>> (accessed on 6 January 2025).

³⁵ For the excavation report, see Nara bunkazai kenkyūjo 1995. A photographic reproduction of the shaving can be found via Mokkanko: <<https://mokkanko.nabunken.go.jp/en/6AFIUOZ0006548>> (accessed on 6 January 2025).

³⁶ For the excavation report, see Nara bunkazai kenkyūjo 1993, esp. 43. A photographic reproduction can be found via Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6AFITC11002432>> (accessed on 6 January 2025).

In other words, the character for ‘monastery’ has been disassembled into its constituent components, arranged in the correct stroke sequence. The character for ‘monastery’ in turn is employed as a constituent element within another, even more complex, character, namely 時 (‘time’).

This tablet exemplifies the use of stroke-order rules as a learning strategy to facilitate the memorisation of characters. Indeed, at the outset of their learning, students were compelled to deliberately deconstruct each character into its constituent parts. Consequently, this facilitated the active production and recognition of the characters in question.



Fig. 3: *Mokkan* no. 3692: *mokkan* with a disassembled character; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

5.5 Tablets with semantically related characters

Wooden tablet no. 3122, unearthed at excavation SD5050VII at the Chiisako Section of the Heijōkyū site, in Nara,³⁷ is made of cypress, cut along the straight grain. It measures 229 × 24 × 2 mm and features a straight upper edge and an arcuate lower edge. The lower extremity is also perforated by a hole at the centre.

The item is, in fact, part of a set of seven wooden tablets perforated with a hole, nos 3121 to 3127, which were originally all plates of a cypress fan frame. Moreover, all the plates have the same handwriting.



Figs 4a–b: *Mokkan* no. 3122: *mokkan* with semantically related characters; courtesy of Mokkanko – Wooden Tablet Database, Nara National Research Institute for Cultural Properties.

³⁷ For the excavation report, see Kitō Kiyooki 1985, 122. A photographic reproduction can be found on Mokkanko: <<https://mokkanko.nabunken.go.jp/ja/6ALTTL47000030>> (accessed on 6 January 2025).

The item under investigation has eight readable characters on the recto (Fig. 4a) and six characters on the verso (Fig. 4b), where one is not clearly legible but can be inferred. The text of the *mokkan* reads as follows:

R. 官宮中大式民治件

V. 有官宮□中²大式

The last character on the recto, 件, which is a measure word for counting articles, items etc., and the first character on the verso, 有, which means ‘there is; what there is; to have’, are not strictly related to the other characters, but are commonly used in administrative documents. The seven characters from 官 to 治 on the front and the five characters from 官 to 式 on the reverse are certainly part of the names of institutions of the eighth-century state.

The character 官 refers to the two councils of the state, namely the Daijōkan 太政官 (‘Great Council of State’), and the Jingikan 神祇官 (‘Council of Kami Affairs’). The characters 宮, 中, 大, 式, 民, and 治 respectively refer to the Kunaishō 宮内省 (‘Ministry of the Palace’); the Nakatsukasashō 中務省 (‘Ministry of Central Affairs’); the Ōkurashō 大藏省 (‘Ministry of the Treasury’); the Shikibushō 式部省 (‘Ministry of Procedures’); the Minbushō 民部省 (‘Ministry of Popular Affairs’); and the Jibushō 治部省 (‘Ministry of Civil Administration’).

In other words, the tablet appears to function as a plate for exploring the vocabulary associated with the ‘two councils and eight ministries’ (*nikan hachishō* 二官八省) of the state, despite the absence of two characters representing the Hyōbushō 兵部省 (‘Ministry of Military Affairs’) and the Gyōbushō 刑部省 (‘Ministry of Justice’). These terms are indispensable for all officials, and it is entirely reasonable that learners would be required to write and memorise them.³⁸ In this instance, however, the emphasis is not on a single character or on the graphical representation of characters. In contrast, a semantic domain is provided, with the characters 宮, 中, 大, 式, 民, and 治 all being co-hyponyms of the hyperonym 官.

Furthermore, other tablets contain terms that are correlated by a semantic relationship of co-hyponymy, meronymy, and antonymy, and which refer to different semantic domains. These include seafood, plants, cereals, various products, or ranks, as well as more ‘empty words’, such as pronouns and deictics.

It can thus be seen that memorisation of specialised terms was a common practice among young officials in training. Indeed, some didactic tools were also designed to assist learners in this process, with the earliest examples of thematic

³⁸ Nevertheless,

inryō 職員令 (*Law on Officialdom*). For more on the law, see Inoue Mitsusada et al. (eds) 1976, 157–196.

dictionaries in the Japanese tradition, known as *kangoshō* 漢語抄, featuring a macro-structure comprising words classified according to lexical families in relation to co-hyponymy or meronymy.³⁹

6 Tablets to learn math

I would like to add a few words about the tablets and shavings that record characters for numbers. They represent a different type of exercise, only partially related to characters and texts in the strictest sense: namely arithmetic. These items were used to learn mathematical rudiments by means of the Chinese multiplication table, which is a necessary foundation for using ‘rod calculus’.

The Chinese multiplication table consists of forty-five phrases that chant the times tables in a distinctly rhythmic way.

The table starts with the line 九九八十一, where 九 is the character for 9, 八 for 8, 十 for 10 or the multiples of 10, and 一 for 1, so that 九九 means 9 times 9 and 八十一 means 81 (literally ‘8 multiples of 10 [and] 1’). In other words, the table starts with the largest number, 9×9 (‘nine nines’ equal 81), and progresses downward. Since 9×9 was chanted as *ku-ku* in Japanese, literally ‘nine-nine’, it is often referred to as the ‘nine-nine table’, or simply ‘nine-nine’.

The example I would like to present here is wooden tablet no. 3604, unearthed at excavation SD285 at the Sakyō Shichijō Sanbō Sanchō Site in Nagaoka,⁴⁰ which, cut along the straight grain, is a fragment measuring about $238 \times 35 \times 3$ mm. The upper edge is perforated by a hole.

The item under investigation contains three groups of characters:

○九々八十一○八九七十二○七九六十□□

The first group consists of the first line of the multiplication table, 九々八十一, where 々 is the so-called repetition symbol, used to repeat the preceding character.

The second group consists of the second line of the multiplication table, 八九七十二, namely 八九 (‘eight nines’) [equal] 七十二 (‘seventy-two’).

The third group is 七九六十□, namely 七九 (‘seven nines’) [equal] 六十□ (‘sixty[-three]’).

³⁹ Manieri 2022.

⁴⁰ For the excavation report, see Suzuki Hiroshi and Yoshizaki Shin 1991, 27. A photographic reproduction can be found via Mokka: <<https://mokka.nabunken.go.jp/en/MK013027000204>> (accessed on 6 January 2025).

Interestingly enough, some of the shavings also reveal mathematical errors – or perhaps memory lapses.

To sum up, I wanted to include this type of item in the study because, even though the focus here is not on the characters themselves, the cognitive process of memorisation through writing on a scraping tablet seems closely related to the practices involved in writing exercises. The repetition and mechanical use of the medium suggest similar strategies for retaining knowledge.

7 Conclusions

The analysis presented in the preceding sections yields several key insights.

First, from the perspective of the materiality of tablets, it is evident that *mokkan* often originated from the repurposing of objects initially intended for entirely different uses, such as fans. The extant tablets are frequently in a fragile and worn state, suggesting they were used to the point of near exhaustion, as exemplified by *mokkan* no. 967, discussed in Section 5.1. The presence of shavings bearing the same character, repeatedly scraped from the same tablet, stands out as a particularly notable feature of these reusable tablets used for writing practice.

Regarding the locations where these tablets (and their shavings) were discovered and produced, it is noteworthy that they were buried in diverse settings, ranging from the capital to provincial areas, and from administrative centres to religious sites. This distribution indicates that the production and use of such tablets were not confined to the places where officials received their training. The practice of writing was undoubtedly a continuous activity, particularly for scribes who were required to maintain their proficiency through regular practice.

From a content perspective, the example in Section 5.1 suggests that some tablets were used for exercises that consisted in practising characters taken from texts in process of being copied or composed. Section 5.2 highlights the technique of mechanical repetition as a fundamental method for learning characters. The examples in Section 5.3 employ one or more components of a character as visual aids for memorisation. In addition to emphasising radicals, which serve as classification criteria, these examples also focus on elements that share visual similarities, thereby helping to prevent confusion among learners and encouraging careful study.

The example in Section 5.4 underscores the importance of adhering to stroke-order rules to facilitate character memorisation. Learners, especially at the beginning of their writing education, would break down characters into their constituent parts, actively producing and recognising them through practice. The

example in Section 5.5 introduces a semantic domain, reminiscent of the thematic organisation found in educational texts such as primers, dictionaries, encyclopaedias, and commentaries from the early Japanese tradition. Finally, Section 5.6 illustrates a parallel learning process based on memorisation and repetition, though focused on number characters for calculations rather than Chinese characters, strictly speaking.

Quantitatively, certain types of exercises appear more frequently than others. The most prevalent type, accounting for at least 40 per cent of the examples recorded in the Mekkanko – Wooden Tablet Database, corresponds to the repetition-based exercise described in Section 5.2. In contrast, there are relatively few examples of the type discussed in Section 5.4. However, in many instances, two or more techniques were employed within the same tablet. Numerous examples (at least 30 per cent) involve tablets where multiple unrelated characters are repeated several times, creating a fragmented mixture of the approaches seen in Sections 5.1 and 5.2.

In conclusion, from a cognitive standpoint, repetition, visual memorisation, semantic association, and stroke order are fundamental mechanisms to solidify the retention of characters. In the context of ancient Japanese education, the rote learning of characters represents an essential preliminary and foundational stage. Nevertheless, in practice, it constitutes one of the most onerous tasks of officials engaged in the daily activities of reading, compiling, and transcribing documents, and one practised throughout their entire careers.

While learners could employ various mnemonic techniques, the act of writing with a brush on a tablet was essential for fully internalising the fluidity and structure of each character. The tactile experience of brushwork significantly enhanced the memorisation process; the more frequently learners practised writing, the more intuitive and natural the process became. This parallels the method of learning the multiplication table, which similarly required rote memorisation and repeated practice through writing. As a result, the demand for a suitable writing surface increased with the frequency of practice. Reusable tablets, typically crafted from Japanese cypress or cedar and easily erased with a knife, emerged as the ideal tools for intensive writing practice within educational settings.

It can be reasonably argued that simply washing a tablet that was meant for rinsing, as practised in other manuscript cultures,⁴¹ might have provided a valid and potentially more straightforward and cost-effective alternative to scraping within educational contexts. However, it is crucial to recognise that writing exer-

⁴¹ See the article by Andrea Brigaglia and Dahir Mu'az in this volume, on Qur'anic tablets in Hausa manuscript culture.

cises were not confined to educational environments, where waterproof tablets could be readily rinsed. At any point in their career, bureaucrats might have needed to practise a rare, complex, or confusing Chinese character. The use of a penknife to scrape the wooden tablet was often preferred to washing, as it allowed for more controlled and precise corrections. The knife was particularly advantageous for removing an isolated mechanical error without disturbing the surrounding text, making it ideal for minor adjustments. In contrast, washing the tablet would have been impractical for such minor corrections, as it involved erasing the entire surface, thus necessitating the rewriting of all the text. This inability to manage partial erasures through washing highlights the practicality of scraping, which offered a controlled, efficient way to maintain the overall text with minimal disruption. Therefore, the availability of the penknife for correcting errors by scraping likely facilitated the widespread adoption of this method of tablet reuse across various settings.

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Index of Written Artefacts

This volume contains an extensive index of written artefacts divided into types, based on the material of the support. Written artefacts are cited as they appear in the relevant contributions; for abbreviations, see the corresponding lists in each chapter. Page numbers with an asterisk refer to illustrations.

Francesca Panini

Inscriptions on stone, metal and ivory

- | | |
|---|---|
| Asb. 23 195 | – XIII 996 242 |
| Asb. 61 200, 207 | |
| Asb. 246 199 | Esar. 118 210 |
| Athens, Benaki Museum | Istanbul, Istanbul Archaeological Museum, |
| – inv. no. FE 31182 289* | – inv. no. 3980T 288* |
| Basilides Codex <i>see</i> Rome, Terme di Diocle- | Nbn. 3 194 |
| ziano, Museo Epigrafico del Museo | |
| Nazionale Romano, inv. no. 65036 | Rome, Terme di Diocleziano, Museo |
| | Epigrafico del Museo Nazionale |
| | Romano |
| Boston, MA, Museum of Fine Arts | – inv. no. 65036 (= Basilides Codex) 274 |
| – accession no. 52.1306 7* | |
| <i>Corpus Inscriptionum Latinarum (CIL)</i> | Senn. 166 195 |
| – VI 9841 236 | Senn. 194 212 |
| – XI 5425 289* | Senn. 223 194, 208 |

Parchment and paper manuscripts

- | | |
|---|---|
| Ann Arbor, MI, University of Michigan Library | Cairo, Dār al-Kutub |
| – Mich. Ms. 112 (= CLM 2365) 359 | – Mağāmī Tal'at 33 394 |
| – Mich. Ms. 118 (= CLM 3147) 359 | |
| – Mich. Ms. 158.37 (= CLM 4578) 359 | Coptic Literary Manuscript Unique Identifier |
| | (CLM) |
| Birmingham, University of Birmingham, | – 193 <i>see</i> London, British Library, Or. 7024 |
| Cadbury Research Library | – 232 <i>see</i> New York, Pierpont Morgan Library |
| – Islamic Arabic 1572a 385 | and Museum, M581 |
| | – 769 <i>see</i> London, British Library, Add. 17183 |
| Brussels, KBR | – 831 <i>see</i> London, British Library, Or. 9035(1) |
| – inv. no. 19.295–97 37, 38* | – 1384 <i>see</i> London, British Library, Or. 4717.5 |
| | – 1695 364 |

- 2365 *see* Ann Arbor, MI, University of Michigan Library, Mich. Ms. 112
- 3147 *see* Ann Arbor, MI, University of Michigan Library, Mich. Ms. 118
- 4578 *see* Ann Arbor, MI, University of Michigan Library, Mich. Ms. 158.37
- 6339 *see* New Haven, CT, Beineke Rare Book and Manuscript Library, P.CtYBR inv. 846, f. 1
- 6532 *see* Salem, OR, Corban University, Prewitt-Allen Archaeological Museum, P.Allen s.n.
- 6544 *see* New York, Pierpont Morgan Library and Museum, M614bis
- 6586 364
- 6607 *see* London, British Library, Or. 9035(2)
- Dublin, Chester Beatty Library
 - Cpt 813 295
 - Cpt 814 295, 297
- Durham, NC, Duke University Library
 - P. Duke inv. G 5 365
- Florence, Istituto Papirologico “G. Vitelli”
 - PSI XIII 1296 (= TM 61688, = LDAB 2839) 362
- Freer Gospel *see* Washington DC, Freer Gallery of Art, F1906.297
- Glazier Codex *see* New York, NY, Morgan Library and Museum, inv. no. G.67
- List of Coptic Biblical Manuscripts (LCBM) 2154
 - see* London, British Library, Or. 4717.5
- Leuven Database of Ancient Books (LDAB)
 - 2839 *see* Florence, Istituto Papirologico “G. Vitelli”, PSI XIII 1296
 - 107731 (= Mudhil Codex) 295, 301
- London, British Library
 - Add. 17183 (= CLM 769, = TM/LDAB 107762) 361
 - Add. 33270 281
 - Or. 3367 367

- Or. 4717.5 (= CLM 1384, = TM/LDAB 108187, = LCBM 2154) 363
- Or. 7024 (= CLM 193) 367
- Or. 9035(1)–(2) (= CLM 831 + CLM 6607, = TM/LDAB 108068) 360
- Sloane 1039 47
- Sloane 2052 47

Mudhil Codex *see* LDAB 107731

- Munich, Bayerische Staatsbibliothek
- Cgm 821 46, 257
 - Clm 10291 300*
 - Clm 18628 256, 258

- New Haven, CT, Beineke Rare Book and Manuscript Library
- P.CtYBR inv. 846, f. 1 (= CLM 6339, = TM/LDAB 108028) 365

- New York, NY, The Morgan Library and Museum
- inv. no. G.67 (= Glazier Codex) 294, 296, 297, 298, 301, 304
 - M581 (= CLM 232) 367
 - M614bis (= CLM 6544) 367

- New York, NY, The New York Public Library, Spencer Collection
- Neth. 1527 94-143 48*

- Princeton, NJ, Scheide Library
- 144 295

- Salem, OR, Corban University, Prewitt-Allen Archaeological Museum
- P.Allen s.n. (= CLM 6532, = TM/LDAB 109378) 362

Šan’a’ Palimpsest 385

Theodoros Codex 271

- Trismegistos (TM)
- 61688 *see* Istituto Papirologico “G. Vitelli”, PSI XIII 1296

- 64806 *see* Vienna, Österreichische Nationalbibliothek – Papyrussammlung, P. Vindob. G. 31487
- 88394 *see* Vienna, Österreichische Nationalbibliothek – Papyrussammlung, P. Vindob. G. 31487
- /LDAB 107762 *see* London, British Library, Add. 17183
- /LDAB 108028 *see* New Haven, CT, Beineke Rare Book and Manuscript Library, P.CtYBR inv. 846, f. 1
- /LDAB 108068 *see* London, British Library, Or. 9035(1)–(2)
- /LDAB 108187 *see* London, British Library, Or. 4717.5

- /LDAB 109378 *see* Salem, OR, Corban University, Prewitt-Allen Archaeological Museum, P.Allen s.n.

Trier, Stadtbibliothek

- Hs. 171/1626 37

Vatican City, Biblioteca Apostolica Vaticana

- Borg. copt. 109 cass. XIX fasc. 73 sup. 364

Vienna, Österreichische Nationalbibliothek – Papyrussammlung

- P. Vindob. G. 31487 (= CLM 6610 = TM 88394 (Coptic text) = TM 64806 (Greek text)) 362

Washington DC, Freer Gallery of Art

- F1906.297 (= Freer Gospel) 295

Papyri and ostraca

Berlin, Staatliche Museen zu Berlin, Ägyptisches Museum und Papyrussammlung

- P. 9755 364
- P. 14283 223

Copenhagen, Københavns Universitet, The Carlsberg Papyrus Collection

- P. 425 359

Coptic Literary Manuscript Unique Identifier (CLM)

- 6610 *see* Vienna, Österreichische Nationalbibliothek – Papyrussammlung, P. Vindob. G. 31487

London, British Museum

- EA 10856.3 359
- EA 74952 359

Oxford, Ashmolean Museum

- 1945.95 (= Papyrus Gardiner 3) 342
- O.Gardiner 104 (= Ostrakon Gardiner) 342

Stockholm, Kungliga biblioteket – National Library of Sweden

- Acc 2013/75 (= TM 64429) 258

Trismegistos (TM)

- 64429 *see* Stockholm, Kungliga biblioteket – National Library of Sweden, Acc 2013/75

Turin, Museo Egizio

- Cat. 1881 344, 345*
- Cat. 1884 348
- Cat. 1888 344, 345*
- Cat. 1906 336*
- Cat. 1939/001 336*
- Cat. 1945/002 348
- Cat. 1966 336*
- Cat. 2047 336*
- Cat. 2056/056 350*
- Cat. 2056/057 350*
- Cat. 2067/118 348
- Cat. 2071/137 348
- Cat. 2073/145 348
- Cat. 2075 350*
- Cat. 2076/154 348
- Cat. 2076/155 348
- Cat. 2080 344, 345*
- Cat. 2082/172 348
- Cat. 2082/173 348
- Cat. 2082/173 + 348, 349*
- Cat. 2082/177 348

– Cat. 2083/178 348
 – Cat. 2083/179 348
 – Cat. 2083/181 348
 – Cat. 2083/183 348

– Cat. 2085/190 344, 345*
 – Cat. 2092/229 344, 345*
 – Cat. 2096/263 350*
 – Cat. 2105/368 348

Clay tablets, cylinders, and prisms

A 878 143
 A 1116-1982 146
 A 1119-1982 124
 A 1246-1982 124, 137
 A 1648-1982 146
 AbB 4, 15 (= TCL 7, 15) 168
 AKT 1, 25 169
 AO 3353 145
 AO 6162 146
 AO 8376 138
 AO 8415 126
 AO 8495 138
 AO 9074 138
 AOFU Wengler 50 124
 ARM 21, 56 126
 ARM 21, 89 126
 ARM 21, 374 126
 ARM 21, 428 132
 ARM 22, 27 126
 ARM 22, 40 126
 ARM 22, 41, M 7754 126
 ARM 22, 322 127, 148
 ARM 24, 221 127
 ARM 24, 222 127
 ARM 24, 223 126
 ARM 24, 224 127
 ARM 24, 229 126
 ARM 24, 256 126
 ARM 31, 154 126
 ARM 31, 214 126
 ARM 32, M 5092 126
 Asb. 10 200, 203
 Asb. 220 198
 Asb. 223 200, 203, 204, 205, 207
 Asb. 224 130
 Asb. 241 198
 Ash 1923.341 (= OECT 15, 122) 126
 AUAM 73.1259 121
 AUCT 2, 54 147

BE 14, 91a 127
 BE 14, pl. XI 118
 BE 15, 133 (= CBS 3306) 118
 BE 15, 160 127
 BE 15, 184 127
 BE 15, 200 127
 BIN 4, 32 165*
 BIN 4, 203 166*
 BM 12389 147
 BM 12390 147
 BM 12419 147
 BM 12433 147
 BM 12436 147
 BM 12617 147
 BM 12911 147
 BM 12923 145
 BM 130244 149
 BM 13086 145
 BM 13141 145
 BM 13253 142*
 BM 13667 124
 BM 13868 124
 BM 14459 121
 BM 15300 145
 BM 15414 145
 BM 15426 145
 BM 16377 124
 BM 18039 148
 BM 18040 148
 BM 18042 148
 BM 18046–18050 148
 BM 18052–18057 148
 BM 19162 153
 BM 19165 132
 BM 19168 145
 BM 19719 145
 BM 20520 121
 BM 21350 147
 BM 21436 146
 BM 22715 127

- BM 22864 137
 BM 23687 145
 BM 23688 120
 BM 26187 130
 BM 26995 147
 BM 28009 146
 BM 28042 124
 BM 32164 150
 BM 32597 149
 BM 33808 149, 150*
 BM 33992 149
 BM 36807 149
 BM 40096 149, 150
 BM 45926 149
 BM 55539 149
 BM 62892 120
 BM 76651 153
 BM 77928 130
 BM 78747 120
 BM 80161 138
 BM 80313 138
 BM 80768 138
 BM 81003 126
 BM 81398 138
 BM 85278 126, 138
 BM 86280 137
 BM 86282 135, 137*, 143
 BM 86289 135
 BM 86451 120
 BM 86452 126
 BM 91157 212
 BM 96943 146
 BM 98972 153
 BM 100476 135
 BM 101984 137
 BM 103740 130
 BM 105405 124, 125*
 BM 106075 124
 BM 106685 124
 BM 106691 124
 BM 109930 145
 BM 109931 145
 BM 110288 124, 146
 BM 113284 148
 BM 115735 132
 BM 117901 153
 BM 123068 136
 BM 123069 136
 BM 123070 136
 BM 123071 136
 BM 123075 136
 BM 123080 136
 BM 123083 136
 BM 123096 136
 BM 128231 153
 BM 131952 28*
 BM 134431 153
 BM 134931 143, 144*
 BM 140668 136, 143
 BM unregistered fragment 130
 Bo 73/s 16*
 Bod A 60 147
 Bod S 411 146
 Buffalo BSNS C 5182 130
 CBS 3306 *see* BE 15, 133
 CBS 3331 140
 CBS 3379 124
 CBS 6165 126
 CBS 6170 126
 CCT 2, 50 168
 CCT 3, 15 168
 CCT 3, 19b 165*
 CFC 126 146
 CT 50 133
 CUNES 48-06-246 143
 CUNES 49-07-016 130
 CUNES 50-03-114 144
 CUNES 51-01-089 127
 CUNES 51-01-091 127
 CUNES 51-01-296 127
 CUNES 51-03-296 127
 CUSAS 8 138
 DUROM U 10771 146
 EA 345 133
 EA 346 133
 EA 348 128
 EA 349 128, 133
 EA 375 133
 Erm 15134 126
 Esar. 44–45 198
 Esar. 48 195, 197, 213

- Esar. 52 198
 Esar. 53 198
 Esar. 60 212
 Esar. 104 194, 195
- FLP 114 124
 FLP 412 124
 FLP 1395 124
 FM 4, 24 126
 FM 4, 31 126
- GMII 305 124
 GMII 605 124
- HS 0238+ 82*
 HS 2220 77*
 HS 2259 147
 HS 2294 79*
 HSM 6388 132
 HSS 10, 5 144
 HSS 10, 70 144
 HSS 10, 71 144
 HSS 10, 107 144
 HSS 10, 142 144
 HSS 10, 180 144
 HSS 10, 187 144
- ICP 1248 146
 ICP 1253 147
 IFAO no. 6163, NU_2006_1985 18*
 IM 5592/4b 136
 IM 5592/7 136
 IM 56967 30*
 IM 58352 124
 IMJ 99.174.0046 124
 ISACM A30276 20*
 ISACM A 31693 146
 Ist Um 251 124
 ITT 2 5770 143
- JRL 9 136
 JRL 12 136
 JRL 27 136
- K 78 148
 K 120b 130
 K 385 148
- K 1611 148
 K 2388 198, 211
 K 2411 200, 201*, 203, 204, 205, 206, 207
 K 2673 209
 K 3162 130
 K 3791 130
 K 4696 148
 K 7862 198, 199*, 211
 K 8664 202*, 203, 204, 205, 206, 208
 K 8904 148
 K 9008 + 83-1-18,141 201
 K 9572 130, 131*
 K 12389 149
 KAAG inv. 23:1466 229
 KAAG inv. 23:1467 229, 234*, 235
 KAAG inv. 23:1610 248
 KAAG inv. 23:1625 248
 KAAG inv. 28:3133 230
 KAAG inv. 32:1388 235
 KAAG inv. 42:15 229
 KAAG inv. 42:39 240
 KAAG inv. 42:73 248
 KAAG inv. 43:190 226
 KAAG inv. 43:194 239
 KAAG inv. 43:224 231, 233
 KAAG inv. 43:235 233, 234*, 235
 KAAG inv. 51:304 229, 230
 KAAG inv. 52:69a 229
 KAAG inv. 4764 240
 KAAG inv. 4766 229
 KAAG inv. 4780 235, 240
 KAAG inv. 7256 224
 KAAG inv. 9614 249
 KAAG inv. 11386 230
 KAAG inv. 14198 227
 KAAG inv. V.03.50/0.2 245
 KAAG inv. V.03.50/0.3 229, 230*
 KAAG inv. V.03.50/0.10 240, 241
 KAAG inv. V.03.50/0.82 242
 KAAG inv. V.03.50/0.137 248
 KAAG inv. V.03.50/0.142 249
 Kt 73/k 14 133
 Kt 93/k 51 184*
 Kt 93/k 60 175*
 Kt 93/k 192 184, 185*
 Kt 93/k 215 173*
 Kt 93/k 290 181, 182*

- Kt 93/k 317 172*, 173, 174*
 Kt 93/k 337 179*
 Kt 93/k 450 175, 176*
 Kt 93/k 688 184, 185, 186*
 Kt 93/k 693 182, 183*
 Kt 93/k 706 179, 180*
 Kt 93/k 712 177*
 Kt 93/k 895 180*
 Kt 93/k 906 178, 179*
 KTS 1, 34a 168
 KTS 1, 44b 169
 KTS 2, 9 168, 169
- L 4667 135
 L 4763 135
 L 5883 135
 L 5889 135
 LB 41 146
 LB 60 77*
 LB 391 81*
 LB 547 81*
 LB 551 92*
 LB 567 92*
 LB 583 82*
 LB 593 82*
 LB 610 124
 LB 781 77*
 LB 797 77*
 LB 891 77*
 LB 1067 82*
 LB 1824 148
 LB 1831 126
 LB 1865 92*
 LB 1895 81*
 LB 1934 148
 LB 1935 148
 LB 1937 83, 92*
 LB 1947 77*
 LB 1971 148
 LB 2016 104*
 LB 2045 82*
 LB 2054 81*
 LB 2112 77*
 LB 2215 92*
 LB 2388 98*
 LB 2421 92*
 LB 2644 103*
- MAD I 86, 106 124
 MARV 10, 27 141
 MDP 18, 133 126
 MDP 18, 162 126
 MH 123/24 124
 MLC 1652 138
 MND 552 269
 MS 1716/1 147
 MS 1908 146
 MS 2724/13 143
 MS 4259 136
 Museum of the Kibbutz Hazore'a 4/776 124
 MVN 3 124
 MVN 10 196 C 146
- NBC 58 124
 NBC 136 124
 NBC 580 146
 NBC 3154 146
 NBC 4223 146
 NBC 6919 126
 Nbk. 2 212
 Nbk. 32 212
 Nebraska 45 124
 Ner. 3 212
 Nisaba 15, 212 147
 Nisaba 15, 298 147
 Nisaba 15, 560 147
 Nisaba 15, 561 147
 Nisaba 15, 877 147
 Nisaba 15, 1074 124
 NMSA 3914 147
 NWHCM 2000.102.2 136
- OECT 15, 122 *see* Ash 1923.341
- Prag I 601 165*
- RC 927 146
- SA 2 147
 SA 63 124
 SE 142 147
 SA 147 146
 Senn. 24 208
 Senn. 156 209
 Senn. 161 195, 203, 204

Senn. 162 203, 204, 205
 SIL 96 146
 Sm 794 153
 SM 1906.2.8 137
 SM 1911.10.114 147

TCL 7, 15 *see* AbB 4, 15
 TCS 360 124
 TM 75 G 1541 143
 Tutub 29 143
 Tutub 34 143

U.3018 19
 UM 42-20-248 145
 UM 47-29-359 147
 UM 47-29-388 147
 UM 55-21-303 15
 UM 72-25-003 124

VAT 425 88*
 VAT 4426 123

VAT 8494 88*
 VAT 9132 123
 VAT 10005 88*
 VAT 10048 (= Ass 19478) 166, 167*
 VAT 15746+15901 91*

WML 56.22.262 135

X.3.098 133
 X.3.124 130

YBC 2148 145
 YBC 4743 138
 YBC 4801 118, 138
 YBC 4802 118, 138
 YBC 4912 (= YOS 13 451) 118
 YBC 7260 127
 YOS 13 451 *see* YBC 4912
 YOS 15 157 124
 YRBC 232 146

Wax tablets

AATG inv. 2002.051.722.1 (= *Tab. Tasg.* 18) 247*
 AATG inv. 2007.003.1281.1 (= *Tab. Tasg.* 12) 249*

BM reg. no. 1934,1210.98 247
 BM reg. no. 1980,0303.91 221
 BM reg. no. 1988,1005.37 248, 249*
 BM reg. no. 1988,1005.110 247
 BM reg. no. 1988,1005.279 233
 BM reg. no. 1988,1005.282 233
 BM reg. no. 1988,1005.288 233
 BM reg. no. 1988,1005.290 245
 BM reg. no. 1989,0602.15 226
 BM reg. no. 1989,0602.18 240
 BM reg. no. 1989,0602.25 233
 BM reg. no. 1989,0602.26 245
 BM reg. no. 1989,0602.32 227
 BM reg. no. 1989,0602.57 248
 BM reg. no. 1989,0602.58 240
 BM reg. no. 1993,1103.4 235
 BM reg. no. 1993,1103.38 249
 BM reg. no. 1993,1103.58 247
 BM reg. no. 1993,1103.133 248
 BM reg. no. 1993,1103.192 248

BM reg. no. 1995,0701.28 242
 BM reg. no. 1995,0701.29 242
 BM reg. no. 1995,0701.389 240
 BM reg. no. 1995,0701.404 235
 BM reg. no. 1995,0701.440 240, 248
 BM reg. no. 2004,0501.61 245
 BM reg. no. 2011,8028.1 226, 228*
 BM reg. no. 2019,8012.36 245
 BM reg. no. 2019,8012.76 248

Hildesheim, Roemer- und Pelizaeus-
 Museum
 – inv. no. 5453 291

LHASA Magdeburg, Rep. Db 14, Halle A II Nr.
 26–31, 185 323

New York, NY, Brooklyn Museum
 – 37.473E 269, 292*
 – 37.474E 269, 292*
 – 37.1908E 269, 292*
 – 37.1909E 269, 292
 – 37.1910E 269, 292

Reading, Ure Museum of Greek Archaeology
– accession number 2018.6.1 221

RIB 2443.1+2 227

RIB 2443.10 229, 240, 241*

RIB 2443.11 235

RIB 2443.13 221

RIB 2443.28 221

RIB 2443.4 240

RIB 2443.6 241

RIBonline Brit. 35.27 240

RIBonline Brit. 40.35 245

RIBonline Brit. 42.9 239

RIBonline Brit. 51.22 235

RIBonline Brit. 51.23 240, 248

Tab. Tasg. 3 229, 230

Tab. Tasg. 12 see AATG inv. 2007.003.1281.1

Tab. Tasg. 17, 30 221

Tab. Tasg. 18 see AATG inv. 2002.051.722.1

Tab.Lond.Bloomberg <WT3> 229, 230

Tab.Lond.Bloomberg <WT4> 227, 240, 241,
242, 244*

Tab.Lond.Bloomberg <WT8> 231, 232*, 245

Tab.Lond.Bloomberg <WT11> 227

Tab.Lond.Bloomberg <WT12> 240, 241

Tab.Lond.Bloomberg <WT20> 227, 245

Tab.Lond.Bloomberg <WT23> 227

Tab.Lond.Bloomberg <WT26> 233

Tab.Lond.Bloomberg <WT27> 227, 240, 241

Tab.Lond.Bloomberg <WT28> 222*, 231

Tab.Lond.Bloomberg <WT29> 223

Tab.Lond.Bloomberg <WT34> 233

Tab.Lond.Bloomberg <WT35> 227, 233

Tab.Lond.Bloomberg <WT39> 233

Tab.Lond.Bloomberg <WT43> 240

Tab.Lond.Bloomberg <WT44> 223, 227, 239

Tab.Lond.Bloomberg <WT45> 227, 239

Tab.Lond.Bloomberg <WT48> 227, 239

Tab.Lond.Bloomberg <WT51> 239

Tab.Lond.Bloomberg <WT52> 239, 245

Tab.Lond.Bloomberg <WT53> 239

Tab.Lond.Bloomberg <WT54> 227

Tab.Lond.Bloomberg <WT55> 227, 245

Tab.Lond.Bloomberg <WT58> 245

Tab.Lond.Bloomberg <WT61> 245

Tab.Lond.Bloomberg <WT64> 227, 245

Tab.Lond.Bloomberg <WT68> 24

Tab.Lond.Bloomberg <WT70> 233

Tab.Lond.Bloomberg <WT72> 223

Tab.Lond.Bloomberg <WT77> 237, 238*, 242

Tab.Lond.Bloomberg <WT78> 222, 237, 238*,
242

Tab.Lond.Bloomberg <WT79> 222

Tab.Lond.Bloomberg <WT80> 227, 240

Tab.Lond.Bloomberg <WT83> 242

Tab.Lond.Bloomberg <WT89> 247, 248*

Tab.Lond.Bloomberg <WT95> 227

Tab.Lond.Bloomberg <WT103> 227

Tab.Lond.Bloomberg <WT120> 227

Tab.Lond.Bloomberg <WT132> 227

Tab.Lond.Bloomberg <WT134> 245

Tab.Lond.Bloomberg <WT135> 235

Tab.Lond.Bloomberg <WT136> 249

Tab.Lond.Bloomberg <WT146> 227

Tab.Lond.Bloomberg <WT150> 227

Tab.Lond.Bloomberg <WT151> 249

Tab.Lond.Bloomberg <WT178> 227

Tab.Lond.Bloomberg <WT183> 247

Tablettes Albertini 32

Th² A10 224

Tit. Helv. 422.1 221

Tit. Helv. 422.2 231

TPSulp 5 224

TPSulp 10 224

TPSulp 75 224

TPSulp 83 224

WMS 142.6 287, 293*

WOODAN 16202000 240

Würzburg, Martin von Wagner Museum,
– K1011 32*

Wooden tablets and shavings

mokkan no. 967 485, 497

mokkan no. 1141 486, 487*

mokkan no. 3121 494

mokkan no. 3122 494*

mokkan no. 3127 494

mokkan no. 3604 496

mokkan no. 4688 489

mokkan shaving no. 1142 487

mokkan shaving no. 1–77 488

mokkan shaving no. 1–78 488

mokkan shaving no. 1–79 488

mokkan shaving no. 1–80 488

mokkan shaving no. 1–81 488

mokkan shaving no. 3692 492, 493*

New York, NY, Metropolitan Museum of Art

– accession number 28.9.4 353*